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OIL WEEKLY

# WORLD OIL

**West Texas New Mexico Issue**

SPECIALIZED FOR EXPLORATION, DRILLING, PRODUCING, PIPE LINE OPERATIONS AND MANAGEMENT

OCTOBER, 1953

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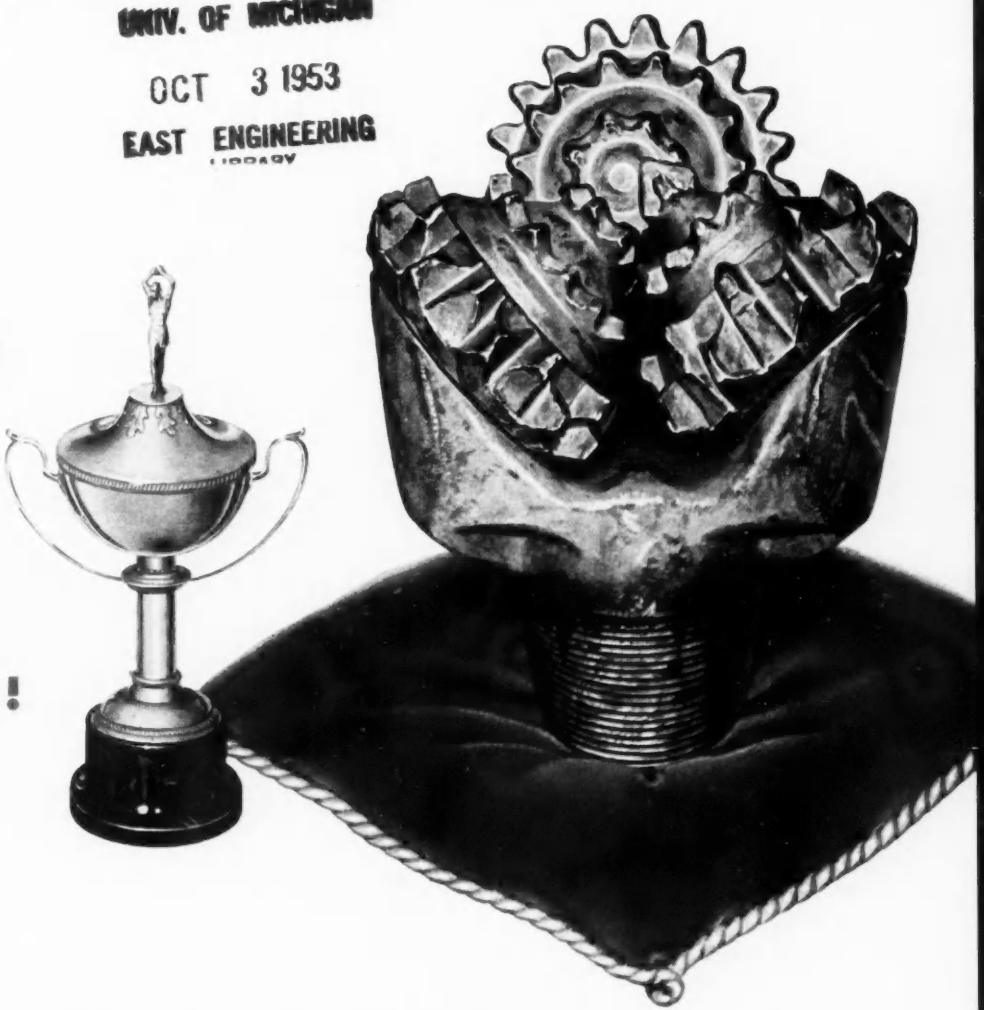

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# A Quick Look at This Issue

BUSY OIL MEN: To help you put first things first, scan these time-saving digests on this and the following pages, checking [√] those you want to read first.

### CURRENT OUTLOOK

☐ **New problems in Iran . . .** could arise because of the possible resumption of oil production. These problems may be even greater than those caused by the shutdown. For a review of the Iranian situation by WORLD OIL Staffer Robert E. Spann, see **Page 94.**

☐ **From behind the Iron Curtain,** WORLD OIL has received some pictures of Russian oil operations. Few pictures of this kind have reached the U. S. in the post-war period. See **Page 96.**

**Turn the Page**

## Really Liked It!

"Wire Line Methods Cut Workover Costs," an article in the August issue of WORLD OIL gives promise of being listed with the "greats" from a standpoint of reprints ordered. By mid-September, 14,850 copies of reprints had been ordered by oil companies, service companies, equipment companies and individuals. The article, by Production Section Editor J. E. Kastrop of WORLD OIL editorial staff, presented, exclusively and for the first time, information on a revolutionary technique of re-working oil and gas wells.

Number 1 on the list of WORLD OIL articles from a reprint order standpoint is the series by H. G. Texter, Spang-Chalfant, Inc., and R. S. Grant, Hughes Tool Company, developed at the request of WORLD OIL and published in late 1948 and early 1949 entitled "Causes and Prevention of Drill Pipe and Tool Joint Troubles." More than 35,000 reprints of this series were ordered!

Second on the list is "Electrical Well Logging," a series run in *Oil Weekly*, now WORLD OIL, in October, November, and December, 1944. This popular series was written by Hubert Guyod, then development engineer of Halliburton Oil Well Cementing Company and now a consultant. More than 20,000 copies of this series were reprinted.

Reprints on No. 1 and No. 2 were of a series of articles and have been requested over a period of time, while the workover article has been in print only six weeks and is a single article.

## A QUICK LOOK . . .

☐ **How to sell ideas to management . . .** here's an article written by an expert in industrial and trade relations. It outlines four basic concepts which, if understood, will help the technical man "sell" his ideas and recommendations to management. **Page 99.**

☐ **Storage of LPG** and other liquid petroleum products in underground chambers is creating a new kind of scientist—the underground storage geological engineer. Here are the factors to be considered in determining ideal subsurface conditions for underground storage and graphic examples of cavern construction in favorable rocks. **Page 102.**

☐ **An employe took a swig** out of a gin bottle in violation of company rules. The "gin" turned out to be carbon tetrachloride. Was the company liable for his violent illness? Yes, indeed! With this issue, WORLD OIL begins a feature which will interest every reader and is aimed straight at the pocketbook of every employer. Authored by a Dallas attorney, "The Courts Say . . ." will strip actual compensation cases of legal gobbledegook and hand them to you in a simple, absorbing style. **Page 111.**

☐ **Serious market trouble threatens** the oil industry. Crude production, refinery runs and refinery yields must be curtailed to prevent flooding the market. The end of winter may find the industry with excessive inventories if action is not taken to reduce output. Some cuts have been inaugurated and others are needed. *Report from the Observatory* shows that gasoline stocks are the major problem. See **Page 116.**

☐ **Bob Smith doesn't like long arguments.** When he became embroiled in a squabble over title to some acreage in the Conroe sand area—worth $1 million—he offered to flip a coin. The other party consented, and they met on the corner of Main and Rusk in Houston. "Tails," said Smith, and up spun a half dollar in The Big Moment for the Houston independent. For how the coin landed, see **Page 124.**

## WEST TEXAS-NEW MEXICO ARTICLES

☐ **One-fifth of all U. S. crude production** is being accounted for by the Permian Basin of West Texas and Southeast New Mexico. It's the third largest producing province in the nation. Production is running about 1¼ million barrels daily and could go several thousand barrels a day higher if the market demanded it. Such a boost would be possible as substantial reserve producing ability is there, and pipe lines have capacity well above current production. The basin has produced 4.8 billion barrels of oil since 1922, and the cumulative recovery is increasing 40 million barrels a month or nearly a half billion barrels annually. **Page 129.**

☐ **Some 210 new oil and gas discoveries** were made in West Texas during the past 12 months. What they were . . . who made them . . . where are they located and the significance of the most important new fields are summarized in an article beginning on **Page 131.** The article includes a complete list of all discoveries in tabular form and a corresponding map of the area.

☐ **New Mexico drilling is still active . . .** with 726 new locations staked in the southeastern four-county area. The leader again during the past year was Lea County with 496 oil and 20 gas wells. Eddy County is picking up with 89 new wells. Five oil wells were

**Special West Texas-New Mexico articles in the Drilling, Production,**

## A QUICK LOOK . . .

found in Chaves County. Roosevelt County didn't add a single well. Deeper drilling is paying off in a big way. New depth records were set for the state; many wells are slated for below 15,000 feet. High concentration of contract rigs can be found throughout the area. For a roundup of southeastern New Mexico situation, turn to **Page 156.**

☐ **Drilling progress in the Permian Basin** in the past five years has substantially reduced the time required to complete wells. The advancement is almost incredible, considering all the difficulties and complexities encountered, says a man who should know. Turn to **Page 163.**

### EXPLORATION ARTICLES

☐ **A new type petroleum reservoir** is coming into the spotlight in the Permian Basin. It's the truncated Devonian pinchout, exemplified by the recent Block 11 field of Andrews County, Texas. For the geology and importance of this type oil trap, turn to **Page 177.**

☐ **A challenge to the operator** is posed by the Raton Basin. Located in Colorado and New Mexico and with an estimated sedimentary column which may exceed 20,000 feet in thickness, the area has been but lightly explored. This article provides concrete information upon which future exploratory work may be undertaken. **Page 180.**

### DRILLING ARTICLES

☐ **They're still adding weight to the bit** in the Permian Basin. Straight and fast hole are dependent on how this weight is applied. Use of rubber stabilizers controls the manner the drill collar weight is applied. This article tells how stabilizers have been run in the Permian Basin . . . with emphasis on the number to be run, positioning on the drill collar string, types to be run, and the advantages. **Page 195.**

☐ **Corrosion fatigue** causes a high percentage of drill stem failures. The rapid depreciation of drill stems in West Texas has brought about some interesting studies. This article offers some solutions to some of corrosion's biggest problems. **Page 200.**

☐ **Here's a discussion,** using actual case histories, to substantiate the findings of Arthur Lubinski and and H. B. Woods as presented previously in WORLD OIL. See **Page 213.**

### Delaware data . . .

☐ The next major oil province in the vast Permian Basin of West Texas and New Mexico will be the Delaware Basin, according to geological studies and current exploration successes. Of 10,000 square miles of highly potential oil country, only a small fraction has been touched. A concise and clear picture of the promising Delaware Basin and what the future holds is presented on **Page 142.** It's one of the West Texas-New Mexico features in this issue. Pictured above is the Richardson and Bass 1 Cobb Federal, a significant 1953 discovery in the Delaware Basin.

☐ **Determine gas-bearing formations . . .** by putting a vacuum on well cuttings while examining them under a microscope. The release of gas bubbles from the cuttings can be observed. The method holds promise for gas logging and may be a money-saver if a new fresh gas show is encountered with no noticeable change in lithology. Turn to **Page 218.**

☐ **Special clays mixed with water** will swell many times their normal volume. Mix these same clays with diesel oil and no swelling takes place. This is the principle of "gunk squeezing"—a highly successful method of restoring circulation losses. Admixtures of bentonite-diesel oil can be spotted in cavernous zones where water or mud will cause it to swell, effectively sealing off large voids. For an article on how to overcome drilling's most trying problem, see **Page 222.**

### PRODUCTION ARTICLES

☐ **Water-flood restores youth** to an old West Texas lease. The newest addition to highly-successful water-floods in West Texas is that of Sunray Oil

**Exploration and Pipe Line Sections. Next Month: Pipe Line Issue!**

## A QUICK LOOK . . .

Corporation's Dora Roberts lease in the Howard Glasscock field. This flood is outstanding in that the latest methods known were used to study this 25-year-old lease in order to plan the most efficient program. Modern equipment and constant expansion will bring production rates up to peaks reached during early flush period. See **Page 251.**

☐ **Combining sand with an acid gel** to fracture and acidize is a new well stimulation technique that's paying off for Stanolind Oil and Gas Company at the North Cowden field in West Texas. Cost per job averages about $5200. After 13 wells were treated, allowables were increased 8440 barrels over previous monthly production schedules. For all the details, turn to **Page 264.**

☐ **Planning a pilot water-flood?** Then take a look at a unique system that incorporates flexibility, is relatively simple, and includes all the features needed to provide information required to evaluate flood potential of a lease or field. For complete details, photos, and a diagram of the filter system, turn to **Page 272.**

☐ **A new concept of wash tank design** has come from an extensive field test program. A 10,500-barrel wash tank was built to take advantage of those features found most efficient in the pilot tests. Photographs of internal construction, diagrams of the finished product, and performance data are included in Part 2 of *"New Wash Tank Design,"* beginning on **Page 278.**

### PIPE LINE ARTICLES

☐ **A new natural gas pipe line** will be operating in the Permian Basin by year's end. For a word-picture description of the Permian Basin Pipeline Company's system, see **Page 305.**

☐ **Bids will be opened** October 14 on the new Haines-Fairbanks petroleum products line that will parallel the Alcan Highway. For details of this and other pipe line construction news and pictures, turn to **Page 316.**

### INTERNATIONAL ARTICLES

☐ **This is Kerr-McGee's Rig 40,** where morale is high, the coffee is dark, the steaks are plentiful, and the bit's in a monstrous hurry. For a look at how men live on a drilling barge 70 miles from home port, turn to *"The Air-Conditioned Roughnecks of Breton Sound,"* **Page 323.**

☐ **Unsurveyed and uncharted . . .** that description has long fitted much of Canada's Alberta Province. Operating oil companies and exploration in the swamp-like muskeg and other rough terrain has been difficult. Now the provincial government has available aerial photographic surveys of much of the province's 255,285 square miles. Where adequate mapping was not available, planimetric maps will be prepared. For a quick description of this $1 million effort, see **Page 331.**

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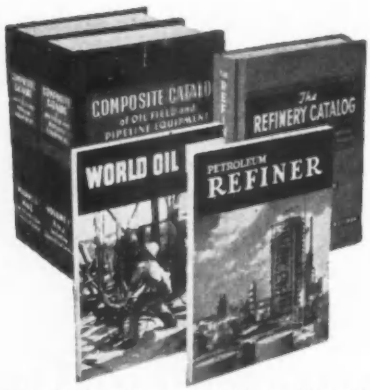


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**PETROLEUM REFINER** and **THE REFINERY CATALOG** for the refining-natural gasoline-petrochemical industry.

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*Indexed by Industrial Arts Index and Engineering Index*

# Looking Ahead . . .

. . . **Probable slowing down of business after end of '53** should be moderate and short. U. S. government spending will remain high, especially since Russia now has the hydrogen bomb.

. . . **Supplies of steel tubular goods for oil and gas companies should improve** in next few months, though these products so far have remained in fairly tight supply. Similarly, there is indicated some easing of the hitherto strong demand for steel plates (for line pipe), sheets, structural shapes, and bars. U. S. steel mills, heretofore operated at 95 percent of capacity, face sagging demand and may slow down to 80 percent by December and average 85 or 90 percent for fourth quarter.

. . . **Prospects for tax relief are only fair . . . not bright.** Excess profits tax for corporations will expire at end of '53, and individual income taxes at same time will be cut about 10 percent. Resultant revenue loss of $5 billion will be matched with cut of U. S. government spending from $73 billion for current fiscal year to $68 billion for year starting July 1 next year. But that's still heavy spending, will mean further budget trouble, may force raising of $275 billion debt limit, and could prevent cuts in excise and corporation income taxes.

. . . **Western Canadian fields will have large market outlet.** Trans Mountain Pipe Line from Edmonton, Canada, to Vancouver will be in operation this month. The $94 million 718-mile line was being filled in September with 2 million barrels of crude. It will supply refineries in Puget Sound area. New loops and pumping stations also will boost capacity of Interprovincial Pipe Line from Edmonton to Great Lakes and Eastern Seaboard from 150,000 to 170,000 barrels daily.

. . . **Detailed estimates of Texas primary and secondary petroleum reserves** will be published early next year by the Texas Petroleum Research Committee. This will be the first time such estimates have been published. Headed by Dr. George H. Fancher of the University of Texas, TPRC was established in 1947-48 by U.T., Texas A. & M. College, and the Texas Railroad Commission, and has been financed through Texas legislative appropriations. The reserves report will present results of a 2½ year study by scientists from the two universities of Texas' 3150 oil fields.

. . . **North Dakota's Governor Norman Brunsdale will officiate** October 25 at ceremonies near Williston dedicating a monument to discovery of oil at the Clarence Iverson farm 2½ years ago and the resultant birth of a new industry for the state.

. . . **Texas independent producers have asked . . .** that production in other states as well as imports be determined in line with market demand, as in the setting of allowable production in Texas. Through Texas Independent Producers and Royalty Owners Association the Texas independents complained they carried more than their share of the burden of shut in productive capacity while unregulated flow of oil from abroad and other states was absorbing Texas' markets. Kansas, Oklahoma and Louisiana have responded by reducing allowables.

. . . **U. S. Supreme Court will consider a petition** filed August 20 by Phillips Petroleum Company asking review of decision of Court of Appeals for District of Columbia, which held that Phillips was subject to regulation as a gas company by FPC. The appeals court had reversed the FPC, in its ruling that Phillips was not a natural gas company under the Natural Gas Act and therefore was exempt from federal regulation.

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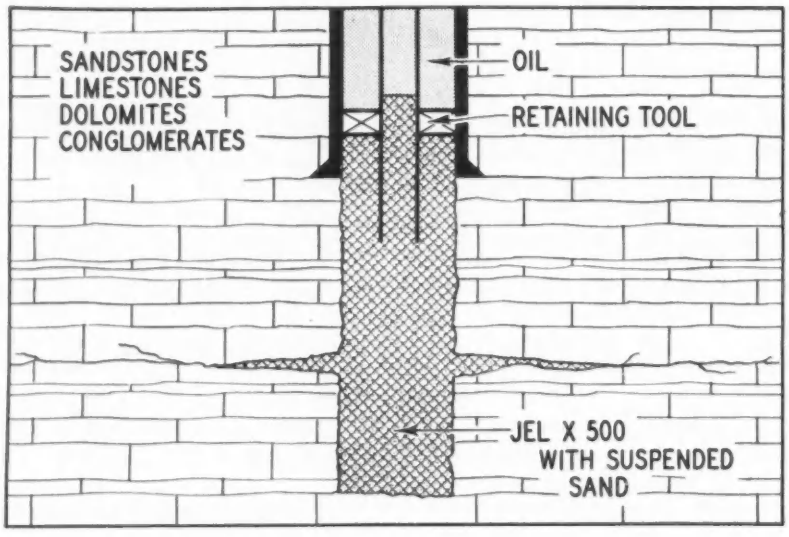


This well's initial production was 19 BOPD. While the well had not declined, it was not considered good for its location. After various other remedial methods had failed, a Dowell Stratafrac treatment increased oil production to 45 BOPD. Payout time was estimated at 36 days.

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# Cartel Suit Should Be Heard

**The Federal Government's** "international cartel" suit against five major U. S. oil companies with extensive operations in foreign lands has been postponed once more. As yet no new date has been announced for the hearing.

The continued "pending" status of this civil anti-trust action is a serious prejudice to the public standing of the entire oil industry. Each postponement results in renewed publicity of the unproved charges, breeding further ill-will toward the industry in the public mind.

It has been more than a year since the original criminal action was instituted by the Truman Administration and longer since publicity was given to the Federal Trade Commission study which labeled international petroleum operations as an "illegal cartel." The brand of "international oil cartel" was imbedded in the public mind by public officials several months before formal court proceedings were commenced. Cloaked in the mantle of secrecy, the contents of the FTC report were withheld from the accused companies while numerous one-sided interpretations were permitted to "leak out" from official Washington circles.

•

**The atmosphere surrounding** these yet unproven charges was improved considerably with substitution of a civil suit for the criminal suit by Attorney General Herbert Brownell, Jr., last April. Willingness of the companies to get to the merits of the case was indicated by their agreement last July to submit records of their domestic operations to the Department of Justice. Subsequently, all five of the companies formally answered the government's charges a month ago, but the scheduled hearing for mid-September has been postponed indefinitely.

Consequently, there is to be further delay before the companies are given an opportunity to defend themselves in court. Procedure under the original criminal charges was before a Grand Jury and therefore not a public hearing. The companies never have an opportunity to publicly tell their side of the story.

•

**Due process of law** is a recognized and necessary guarantee of democracy, but it also is a principle of U. S. justice that a defendant have an early opportunity to present his answers to alleged illegal practices.

A few centuries ago, innocence or guilt in some parts of the world sometimes was established by whether or not an accused person suffered harm when submerged in boiling water. Even then, the accused wasn't left in the water to boil indefinitely!

Warren L. Baker

# New Problems Arise in Iran

**• Should production resume, a serious threat of oversupply would arise.**

**• Resulting pressure on prices would be felt in oil fields around the world.**

**By ROBERT E. SPANN,** WORLD OIL Staff

POSSIBLE RESUMPTION of oil production in Iran for export markets poses greater problems than were created by the shutdown of the giant petroleum industry more than two years ago. Its primary impact—a potentially serious oversupply of petroleum with consequent pressure on prices—would be felt in oil fields around the world.

A return of Iranian oil is still far from reality. Several times since the properties of Anglo-Iranian Oil Company, Ltd., were expropriated on March 15, 1951, a possible settlement appeared near, only to be scuttled by the uncompromising stand of former Premier Mohammed Mossadegh. The biggest obstacle to a possible settlement, however, was removed with the overthrow in mid-August of the 28-month rule of Mossadegh by forces loyal to the Shah, led by Gen. Fazlollah Zahedi.

Early meetings have been indicated by the new Iranian government with Anglo-Iranian Oil. As premier, Gen. Zahedi will set the Iranian policy. He was a leading supporter of Mossadegh's oil "nationalization" law and throughout his political career has been an ardent Nationalist, though a loyal supporter of the Shah. During World War II, Gen. Zahedi was arrested by British agents and interned for the duration in Palestine, charged with collaboration with the Germans. These facts certainly offer no assurances the new government would agree to terms acceptable to A.I.O.C.

The ultimate success of the possible negotiations that may result between Iran and Anglo-Iranian on the oil dispute will depend primarily on:

- Whether the present Iranian Government in the long run can win a real test of confidence with the Iranian people and establish itself as a stable government. It has won an important vote of confidence, however, with the decision of President Eisenhower, with approval of the British Foreign Office, to grant the nation direct financial aid of $45 million and approved the continuation of U. S. technical assistance at an annual rate of $23.4 million.
- Whether Gen. Zahedi will be willing to risk his political life and reverse the position maintained by Mossadegh in the oil dispute. This would involve an agreement by Iran to compensate Anglo-Iranian for loss of physical properties and breach of contract. Only after these claims have been satisfied can Iran expect to resume production in substantial volume.

Any expedient settlement that may be urged on Anglo-Iranian by diplomatic pressure from either side of the Atlantic that would ignore the basic legal question of outright abrogation of contract could place international oil companies (as well as all other private capital entities operating abroad) in a precarious position. Both American and British companies have felt the effects of the "dictated" settlement during the Roosevelt administration of their claims against the Mexican expropriation.

In previous negotiations with former Premier Mossadegh, Anglo-Iranian has held firmly to its position that its claims under the cancelled 1933 concession agreement with Iran must be considered. The company, in its final proposals to the Mossadegh government, offered to submit the claims to arbitration by any international tribunal and indicated willingness to be compensated over a period of years from revenues that would accrue to Iran from oil sales.

A revival of petroleum operations in Iran somewhere near the pre-expropriation level is essential for the long-term economic and political survival of the bankrupt nation. Equally important, it is imperative to the overall success that the marketing of production (if not the actual production operations) be managed by a recognized international petroleum organization. Whether or not Anglo-Iranian, once its claims against the expropriation action are settled, would be willing to participate in such an operating and marketing arrangement remains to be seen.

**Market for Oil.** Stated briefly, Iran must be willing to face present economic fact: That while it urgently needs revenues from oil sales, the former consumers are no longer dependent upon oil from Iran. Similarly, other oil producers must recognize the reality that any substantial exportable production from Iran will have to enter western world markets at the expense of production elsewhere if a temporary, or possibly permanent, glut of oil is to be avoided. An attempted "go it alone" policy would be financially disastrous for Iran, as has been proven during the past two years, and could bring serious hardship to the international petroleum industry.

Even temporary conditions of oversupply are in contrast with good conservation principles, and in the long run would be against the best interest of petroleum consumers. An "arrangement" or an agreement of any form by competing companies (including U. S. firms) that would permit Iranian oil to enter present marketing channels without serious disruptions, though, could be termed an illegal "cartel" under recent interpretation of U. S. laws.

A return of Iranian oil to international trade, even though the possibility may not be realized before next year or even later, would find the pattern of world oil economics considerably changed from that existing prior to mid-1951. First of all, bar-

ring the unexpected, Iran could never expect to regain its importance in world petroleum supply that existed in 1950 when the nation produced 6 percent of the world's total crude oil. It is doubtful, also, whether Iran could regain its status as the largest producer in the Middle East; Saudi Arabia and Kuwait have pushed far ahead of Iran's previous highest productive level and Iraq is gradually reaching a position of equal importance.

More important, the trend of world petroleum demand has returned to a more normal rate of annual expansion. And with the increasing growth of supply at a faster rate than the expansion in demand, competition for world markets has sharpened. Just prior to and at the time of the Iranian expropriation, world demand for petroleum was increasing annually from 10 percent to 12.5 percent. In terms of barrels daily, the annual expansion in demand approximated 1.2 million. The gain in demand last year was at the more modest rate of 5.2 percent over 1951, or 634,000 barrels per day, and the indicated gain for 1953 will be about 6 percent, or about 800,000 barrels per day. Similar rates of gain over the next few years are indicated by various long-ranged forecasts.

**Production Up.** While the rate of new petroleum supply throughout the world has grown at a more rapid rate than demand, the increase in productive capacity has been even greater. Actual new supply has been held in check to a great extent by cutbacks primarily in the U. S. and Venezuela. The more than 600,000 barrels daily of crude oil production that was withdrawn from world market channels by the Iranian expropriation has been more than offset by increased output in the Middle East alone. This discounts the increased production that was reached in the U. S. and Venezuela, and later cutback, to help meet the initial shortages created by the Iranian withdrawal. The region comprised of Bahrain, Iran, Iraq, Kuwait, Qatar and Saudi Arabia produced 2,230,000 barrels daily at the time of the expropriation. With Iranian production closed in, the remaining Middle East nations now produce more than 2,500,000 barrels per day.

With the anticipation that future annual growth in petroleum demand will range from 4 percent to 5 percent or 6 percent, statistically Iranian crude oil production gradually could be absorbed into existing supply channels without serious direct cutbacks elsewhere, though adjustments in rates of production would have to be made. A re-entry of Iranian oil, however, would capture the major portion of the increased annual demand that other producers expect to share in each year.

Should some form of a plan be effected to "make room" for Iranian oil, it may be difficult to sell to Middle Eastern rulers that have grown accustomed to an increasing jingle of coins flowing into the royal coffers each year from their 50 percent interest in oil produced in their domains.

The unanswerable question is whether any settlement that would return Iranian oil to western markets would upset the present concession terms elsewhere in the Middle East and bring on a new round of demands by shieks and kings. In effect, any such plan may bear the apparent stigma of "guaranteeing" Iran a portion of world oil markets that in its absence has been more than adequately filled by other producers. Middle East rulers are the most sensitive of their relative production; i.e. which nation receives the best royalty and tax agreement.

A year ago when proposals for solving the Iran-A.I.O.C. differences were being submitted by the U. S. State Department the figure of 400,000 barrels daily was frequently mentioned as the "estimated minimum production needed by Iran to sustain its economy."

The possibility of resumption of refinery operations at the 500,000-barrels-daily-capacity Abadan plant is even more in the realm of speculation. The plant has been damaged by pilfering and neglect, just how serious is a matter of guesswork. The best informed persons say at least two years would be required to ready the plant for capacity operations, including preparations necessary to house non-Iranian technicians.

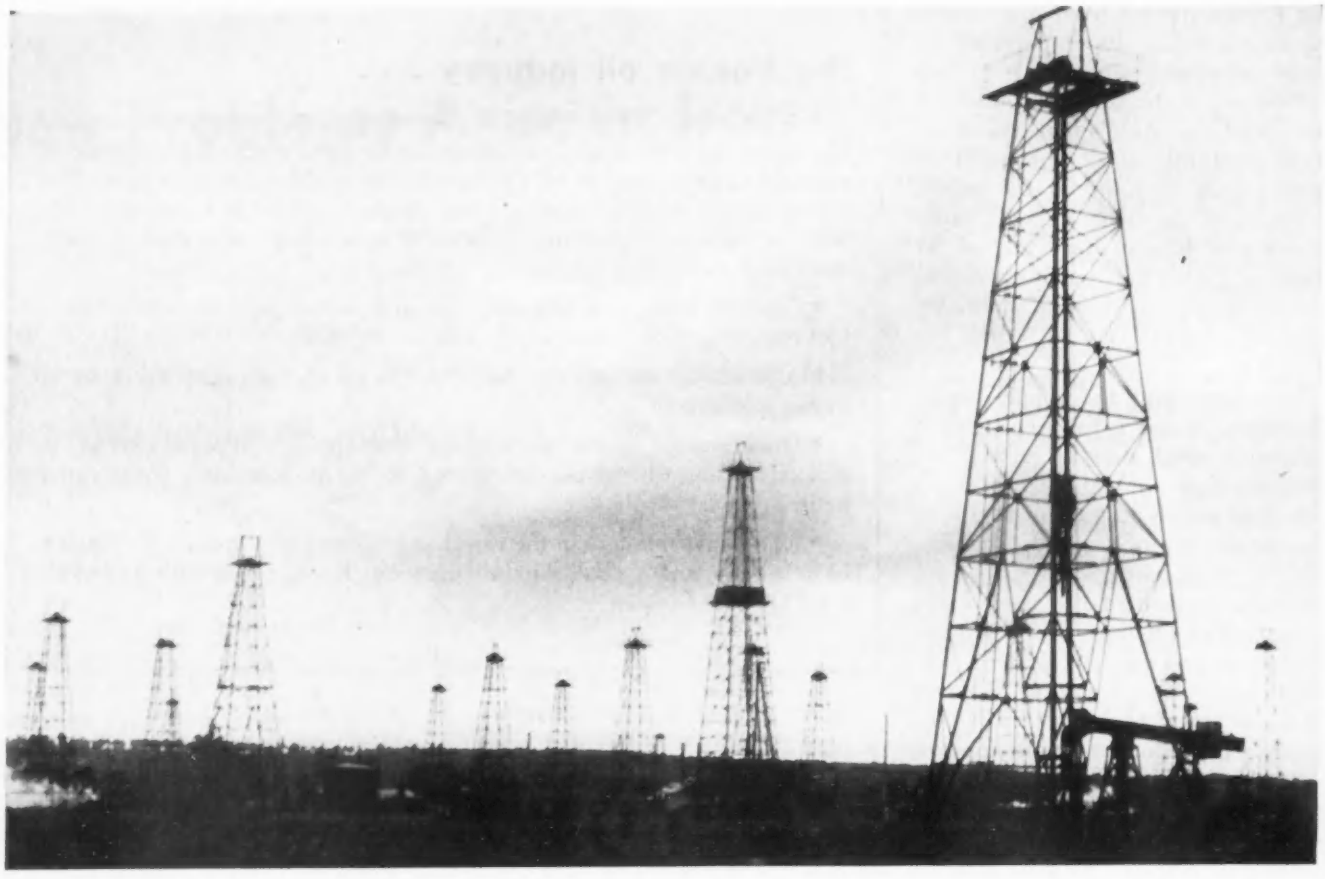
The over-all consideration, however, is that the importance of this plant—the world's largest—has been greatly diminished by the accelerated rate of building more modern refinery capacity elsewhere. Also, the major non-producing, but large petroleum-consuming nations, now generally stipulate that their petroleum requirements be met by imported crude oil to be refined at home. Though relatively small petroleum producers, some nations such as Italy and The Netherlands, for example, have had such a great expansion in their petroleum refining capacities during the past couple of years that they now import crude and are major exporters of refined products.

—The End.

## the Iranian oil industry . . .

The overthrow of the Iranian Government of Premier Mohammed Mossadegh by Gen. Fazlollah Zahedi has brought renewed speculation of a possible resumption of oil production for world markets in Iran. The oil industry in Iran as existing when Anglo-Iranian Oil Company, Ltd., was forced to withdraw from its 100,000 square mile concession in southern Iran is immense. It includes:

- Eight oil fields with 87 producible wells, which prior to expropriation had reached a peak output of 731,000 barrels daily.
- A pipe line network totaling 1020 miles of lines from three to 22 inches in diameter.
- Underground crude oil reserves estimated by WORLD OIL at 13 billion barrels, which may be proved to be an extremely conservative figure.
- The largest refinery in the world at Abadan with capacity for 500,000 barrels daily, and a small skimming plant at Kermanshah with a capacity for 2300 barrels daily.



**BIGGEST OIL PRODUCER** in central Europe is Austria's former "granery." A total of 20½ million barrels of oil was supposed to have been produced during 1952. Soviet authorities claim East Austria as German Assets and have earned a profit of at least $175 million during past seven years.

# Oil Operations Behind the Iron Curtain

OF WIDE INTEREST to the western world's oil and gas industries is the status of Soviet occupied and operated oil fields in satellite nations of Europe. While a rigid cloak of censorship remains drawn about these fields, the Soviets have been unable to prohibit the dissemination of all news from critical areas. On these pages are examples of lengths to which persons imbued with an earnest desire for interchange of information will go. These photographs were forwarded to WORLD OIL by two of its European correspondents who must necessarily remain anonymous. Through these pictures, they have given a glance into Soviet operations and at Red equipment.

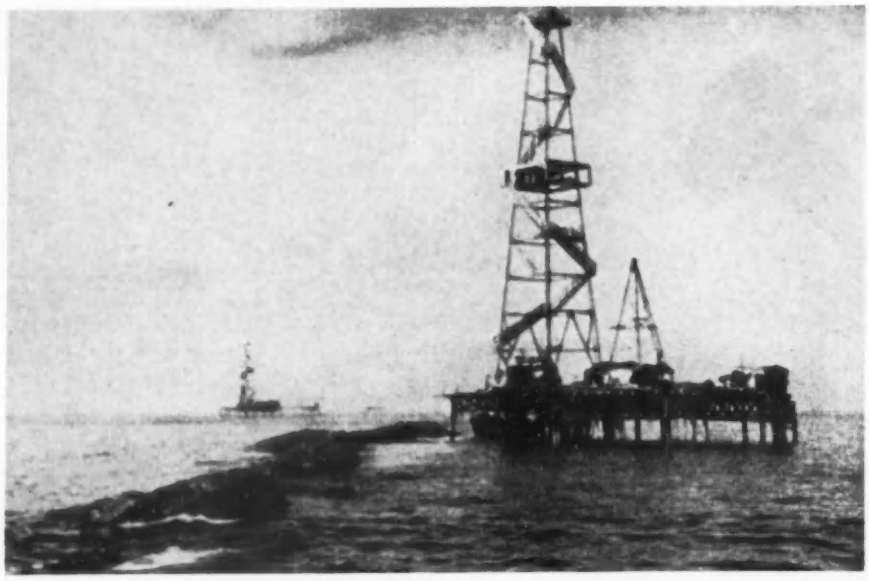
**ZISTERSDORF RAILROAD STATION . . .** a photo taken behind a Communist work guard. Area at right was in flames in 1951 when oil tanks exploded. Sabotage was blamed. Tank cars are from East Berlin. East Germany is receiving more and more Austrian oil, delivered by Soviet Mineral Oil Administration. Austria receives neither taxes nor customs duties from these exports.

**KORNEUBURG REFINERY.** This refinery was taken over by Russia in 1946 after ratification of Potsdam Agreement, which entrusted refinery to Soviet operation pending final settlement of German Asset problem. Previously Soviets had dismantled parts of refinery. Now they have resumed operation for Soviet profit.

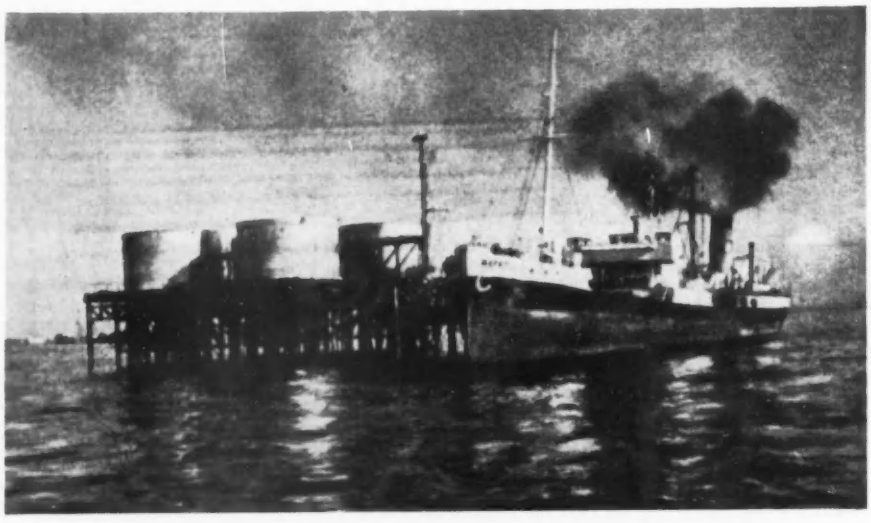
**THIS IS MATZEN OIL FIELD.** Rigs are being built in Soviet-occupied German Asset plants in Eastern Austria.

**THIS WAY TO ZISTERSDORF,** formerly the Since 1951, it has been surpassed by Matzen field, about 20 miles further south. Matzen was discovered by Soviets in 1948- principal oil-producing region of Austria. 49, but is being claimed as German Asset. Note crude direction sign in Russian. Such signs are visible in increasing numbers on approaches to the fields.

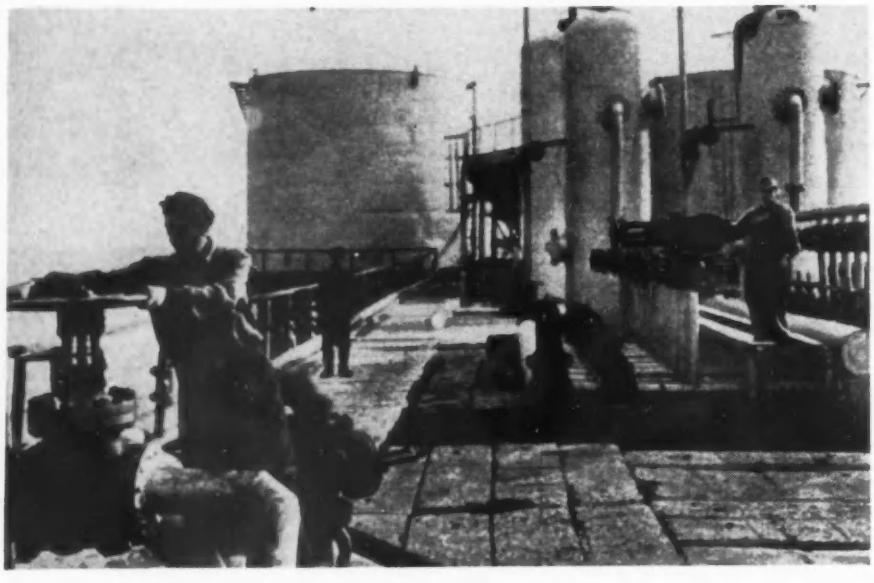
**ROLLING STOCK** of Austria's Federal Railroad was declared Soviet-captured material under title of German Assets. Now, transportation of crude is handled by these tank cars at expense of Austria and for profit of the Russians. All other railroad rolling stock is lent to Austrians.



**RUSSIAN PRODUCERS** situated offshore in the Caspian Sea near Baku.



**RUSSIAN TANKER** taking on cargo of crude at offshore loading and storage platform in Caspian Sea near Baku.



**RUSSIAN PETROLEUM** collection installation off Baku in Caspian Sea. Note attendant at extreme right is a woman.

# Oil Operations Behind the Iron Curtain

# How to Sell Ideas to Management

- **A technical man must be a salesman.**
- **He must adjust himself to people.**
- **He must recognize management aims.**
- **He must show promise of a profit.**

**By PROF. M. L. POWERS,**
University of Oklahoma

THE PRIMARY FUNCTION of technical men on an industry payroll is to make money for the company.

This is particularly true of engineers, geologists, chemists and all technical men who are a part of this fast-moving and progressive oil industry. This function, however, cannot be performed unless the technical man's know-how can be translated into ideas and recommendation which in turn are translated into action by management approval.

This means a "selling" job by the technical man. The technical man who succeeds in "selling" his ideas and recommendations fulfills his functions in the organization and is rewarded by promotion and salary increases.

The man who fails to "sell" vegetates in his job and makes little or no progress. He may have exceptional technical ability, but if he has failed in selling management his ideas and recommendations he is, to put it mildly, a near-failure.

Some time ago an oil company executive told about a geologist who had been assigned to a particular area to make a special study. When his report reached the general office it was received with interest, but it lacked sufficient information to justify a decision. The man was asked to appear in person to supplement the information contained in the report. But when he made a personal appearance he was unable to communicate his ideas meaningfully and so killed any interest of management in his recommendations. The result was two months of wasted effort by both the geologist and the company.

Unfortunately, too many qualified technical men fail in this important selling job. Surveys show such failures to be well above the percentage average expected within a group so well prepared technically for their jobs. These failures constitute an important intangible loss to industry in both profits and progress. Two oil company executives reported that two-thirds of their technical men fail to make substantial advancement during their first five years, a period within which they should have won recognition as candidates for future executive posts. This does not mean they have failed as technical men. It means they failed in the primary function of "selling" themselves, their ideas and recommendations to management. They failed to make tangible and material contributions to their company's progress and profit.

Analytical studies by trade and industrial service experts reveal four primary factors contribute to the technical man's inability to "sell" himself, his ideas and his recommendation:

- His inability to adjust himself to people.
- Failure to fit himself into the interests of management and to recognize and work for those things considered important by management.
- Presenting ideas or recommendations lacking profitability.
- His inability to properly present an idea or recommendation, orally or in report form, so that it can be readily understood by management.

**Selling Job.** Inability to adjust to people is a serious, but not an insurmountable problem. A liberal application of psychology and common sense will generally overcome it. This problem usually confronts the young technical man fresh from the university and assigned to field work. He should accept the fact that he has a lot to learn, and that he can learn from men who have no college degree; from crewmen, roustabouts, pipeliners, stillmen, foremen and supervisors. He must not shut himself up in an ivory tower of technology. He must work with, and respect the ideas of non-technical workers. These practically trained men usually have long years of service in the organization and believe they know something of the oil business, which they do. The technical man fresh out of college must adjust himself to these people to win their liking, respect and confidence.

He must realize that while engineering is recognized and accepted throughout industry, there are many non-technical field men who view the engineer with suspicion and who question his ability to handle practical field problems. In overcoming this prejudice the technical man must conduct himself with tact, avoid a "know-it-all" attitude and avail himself of the knowledge which the practical man has gained through experience.

By "selling" himself to his co-workers the technical man lays the foundations for subsequently "selling" his ideas and recommendations to management. It follows that if field personnel like, and have confidence in the young engineer or geologist, they will make his job easier, make field information readily available and support him with management. The technical "snob" on the other hand can expect neither cooperation nor support from field personnel. Without this support he is far from being in position to present, much less "sell" new ideas or recommendations to management.

One mistake made by young technical men is to underestimate the importance attached by management to

the opinions of field men. In many instances men who occupy top management positions have come up through the ranks. It is natural they should respect and heed the advice and opinions of field men. Recommendations usually channel to management through supervisors and they, in turn, consult with their field men. Without their support the technical man makes little or no headway. Therefore, if he is to succeed, he must realize that management listens to, and respects the opinions of field supervisors and field men.

**Management.** As equally important to his "selling" job is the technical man's ability to fit himself into the interests of management and to recognize and work for the things considered important by management. Briefly stated, he should adjust himself to and work in conformity with company policy. Ideas and recommendations contrary to management thinking and policy have little chance of acceptance.

When he joins an organization the technical man should acquaint himself with its setup, from top to bottom, learn its aims and policies and establish his personal status and relationship to various line and staff people in the corporate structure.

Many technical men fail to understand this.

The engineer or technical man is usually assigned to a staff position and his function is to inform himself on operations and give advice or make recommendations. This is a difficult idea for many staff people to accept. There is a strong urge to "run something," to be in a position to tell someone to do something. It should be remembered that the functions of running things rests with the line organization. The staff man is responsible for the quality of his recommendations, which must conform to his organization's objectives and be acceptable to those responsible for operational functions.

**Profit Aim.** Presenting a new idea or recommendation is not enough.

Every new idea or recommendation must be profitable to the company. Management's responsibility is to see that the company makes money. Unfortunately, many technical men overlook this. Instead of concentrating on money-making ideas and recommendations, they submit for consideration ideas which may be "nice" but which have no profitability. Here it may be mentioned that thinking along conventional lines seldom generates new ideas. If the technical man realizes that others in his profession are continually seeking new approaches to current problems, his chances for success are far greater if he strikes out along less travelled courses. Some of his ideas may appear crazy, but if he can "sell" management on their profitability they will be accepted. Some of the craziest ideas have become standard practice in the oil industry.

**About the Author**

PROF. M. L. POWERS is a graduate engineer with a background in construction and oil field work, much of which has been active in a supervisory capacity. He has been active in vocation education for 16 years, and has developed much instructional material for vocational courses, including some in cooperation with the American Petroleum Institute. At present he is a specialist in the Trade and Industrial Services of the University of Oklahoma at Norman.

**Clear and Short.** So far we have touched on three important factors bearing on the technical man's ability to "sell" his ideas to management.

The fourth factor which has ruined many a promising technical career is inability to properly present an idea or recommendation so that it may be readily understood by management.

Unfortunately, this lack of articulation is a common failure among engineers and other technical men. Universities recognize the problem and are doing something about it. Every effort is being made to teach the student how to present a report in a lucid and straightforward manner. This failure can be corrected by rigid self discipline on the part of the technical man who is generally inclined to wordiness. A "learned" report may satisfy the writer's ego but it "grinds little corn" with the busy executive. A chief engineer for a major oil company stated that 90 percent of all recommendations prepared by his field engineers had to be either re-worked or returned for additional information. Another executive complained of voluminous reports which remain unread for lack of time. Still another said that most ideas, recommendations and reports were so obscurely worded they could not be understood.

A report on an idea or recommendation should, if possible, be confined to one page and not to exceed two. The first page should set forth the proposal, why it is made, what it will do, what it will cost and how the company may expect to profit, financially or from an efficiency standpoint. Substantiating data should be attached. If a longer report is necessary it should be briefly summarized so that the busy executive can assimilate it.

An important point to remember in "selling" an idea or recommendation is to spell it out in terms easily understood by the man who is to make the decision. If this individual is not an engineer or technical man it should be written in non-technical language. Executive resent being placed in a position of having to admit they do not understand what, after all, may be a simple engineering proposition. Rather than make the admission an executive may ignore, or completely reject the proposal.

**Summary.** In summary, it may be said that the traditional conflict between practical and technical men has not yet been resolved, and probably never will be. But the engineer or technical man has it in his power to improve the relationship between both groups. Positive action on his part will result in profit to himself as an individual, to field men and to his company. It is his duty to establish himself with his associates in the organization.

The majority of personnel failures in industry are due to the inability of the individual to deal with people. The first and most important consideration for the technical man is to establish a relationship with practical men in the field built on confidence. This must be a two-way relationship wherein the technical man acquires confidence in the judgment and experience of field people and they in turn learn to respect and have confidence in him as an engineer.

The engineer must acquaint himself with the organizational structure and recognize those things which are important to management, coordinating his efforts, thinking and recommendations in accord with those objectives which are better understood as "company policy."

Finally, he must "sell" ideas and recommenndations which are potential money makers, and remembering that "oil men are busy men," present them in such a manner as to be readily understod by management.

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# How to Determine Sites For Underground Storage

**Here are the requirements of subsurface reservoirs for LPG and other petroleum products.**

**By HAROLD S. THOMAS,** Research Geologist,
Phillips Petroleum Company, Bartlesville, Okla.

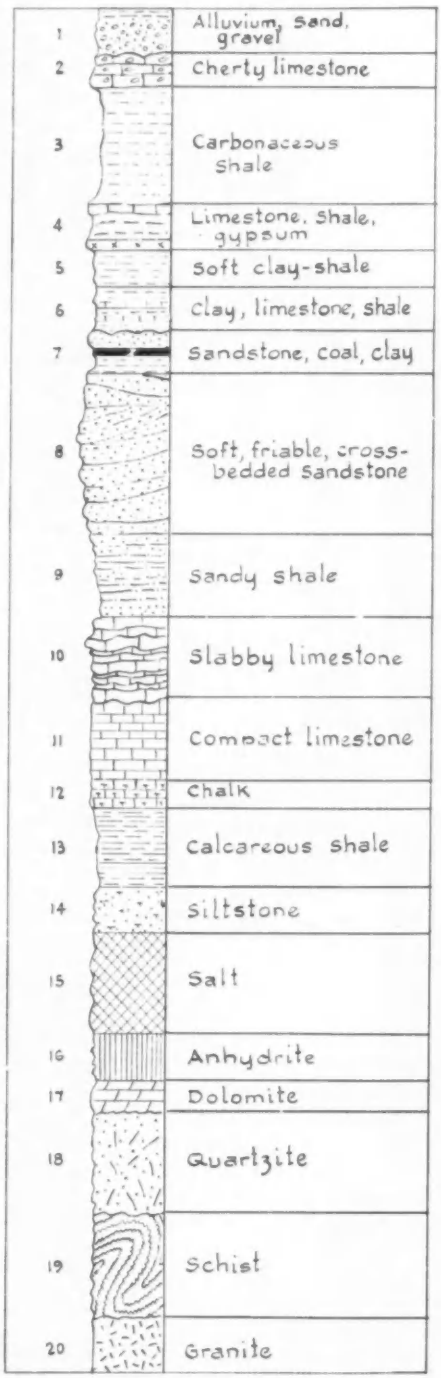


FIGURE 1

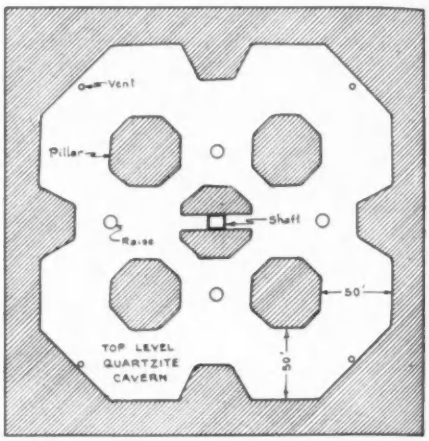


FIGURE 2

THE HIGH COST of tank steel, the inability to obtain adequate supplies of steel for high-pressure tanks, the fire and bombing hazards of above-ground storage—these and other factors contribute to the acceptance of underground storage for liquefied petroleum gases and other liquid products. As a corollary, it is creating a new kind of scientist, the underground storage geologist-engineer. The demand for engineers and geologists with a thorough knowledge of subsurface conditions and their relation to the storage of LPG and other petroleum products underground is increasing.

Comparative costs alone of storage in unlined caverns versus steel storage on the surface demand the rapid creation and utilization of subsurface storage facilities, and this in turn calls for the training of petroleum geologists and engineers in the important, relevant, technical details of mining engineering, geology and economics.

**Geological Requirements.** The economic storage of petroleum products underground is possible with any product — gas, liquid, or liquefied gas—but the problems vary according to the different physical and chemical characteristics of the stored substances. Natural gas, for example, is being stored successfully in depleted oil and gas sands and in water sands where structural conditions are favorable. Petroleum, gasoline and light oils immiscible with water are stored in abandoned mines and deep caverns in Sweden, entirely surrounded by appropriately regulated ground water supplies. Similar storage of liquid propane and butane under pressure in deep, somewhat pervious or fractured caverns may be possible, but it will require much technical engineering skill to work out a balanced control of hydrostatic and LPG pressures.

Special consideration must be given to the storing of chemicals underground, for example liquid anhydrous ammonia, which is completely miscible with water and is capable of dissolving most morganic salts. It is apparent that for ammonia, at least, a water-tight limestone, shale or salt cavern is preferable to other kinds of underground storage media, such as saltwater sands and depleted oil and gas sands.

Geological preference for LPG storage is given chambers leached out of thick beds of rock-salt or caverns dissolved from salt domes. Such storage chambers are impervious, contain no water-bearing horizons, can usually be enlarged as required, and cost much less to construct than other types.

Present requirements for the underground storage of liquefied petroleum gases (and it is with LPG that we are here primarly concerned) include:

- An open cavern of adequate size which, when filled in the slack summer months, will supply quantities sufficient for the winter market.
- A cavern of sufficient depth to guarantee safety, but not so deep as to greatly increase construction costs.
- A structurally strong, leak-proof cavern that will last 100 years.
- A cavern located on or near a

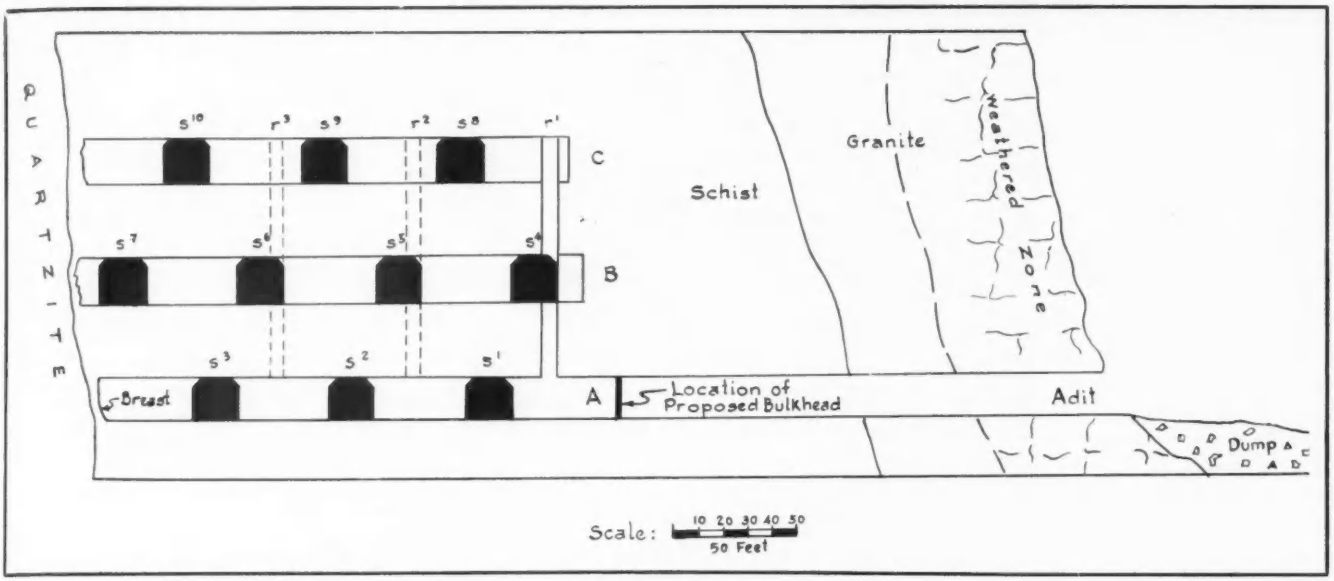


**FIGURE 3**

products pipe line and on company property.

• A storage chamber situated near the metropolitan market and adjacent to rail, water, and highway transportation.

Several minor factors relating to the location of the cavern must be considered.

It should be an adequate distance from surface structures and property lines.

Topography must favor good drainage and afford space for construction operations and permanent facilities.

A good water supply and abundant electric power is essential.

Additional land for purchase must be available if needed.

The age, type and character of rocks to be utilized as media for the creation of underground chambers for storage of propane, for example, are all important. Depth below surface in any event depends on the liquid to be stored. For propane, which may reach a temporary pressure near 200 pounds per square inch locally within the cavern, the back (roof) of the chamber should be approximately 200 feet below the surface; this depends somewhat on the strength and character of the rocks above the cavern. The stratolithologic section (Figure 1) shows the various kinds of rock which may be encountered, singly or in groups, in most areas. These are taken up by number and discussed briefly below, according to their rating as favorable or unfavorable cavern rocks, with reasons for my beliefs—based on actual experience with caverns, laboratory analyses of cores, field experiments, and detailed studies of outcrops.

1. ALLUVIUM, SAND, GRAVEL—unfavorable; usually at and near surface, incompetent, water-bearing.

2. CHERTY LIMESTONE—favorable only if limestone of adequate thickness lies entirely below fractured, weathered zone, and contains no chert beds; nodular chert normally does not eliminate a limestone for storage consideration.

3. CARBONACEOUS SHALE—unfavorable; contains plant remains and carbonaceous or bituminous material which provide avenues for contamination and escape for the stored LPG.

4. LIMESTONE, SHALE, GYPSUM—generally unfavorable if thin-bedded; a thick, strong shale below an impervious, thick-bedded limestone approaches the ideal, if water is absent; gypsum nodules in limestones not objectionable.

5. SOFT CLAY-SHALE—unfavorable; structurally weak, may contain or admit water.

6. CLAY, LIMESTONE, SHALE—unfavorable if thinly interbedded; such interbeds are usually weak, sometimes plastic, frequently contain water.

7. SANDSTONE, COAL, CLAY—unfavorable; coal weak, thin, adjacent to undesirable clay or sandstone; clay weak, plastic; sandstone usually thin and weak, sometimes water-bearing when above coal.

8. SOFT, FRIABLE, CROSS-BEDDED SANDSTONE—unfavorable; weak, pervious, water-bearing. Competent sandstones may eventually be used when we discover the correct formula and technique for lining porous rocks.

9. SANDY SHALE—unfavorable; weak, water-bearing.

10. SLABBY LIMESTONE—unfavorable; usually thin-bedded with thin shale seams; weak, water-bearing.

11. COMPACT LIMESTONE—favorable; one of the best cavern rocks, particularly good for LPG and liquid ammonia.

12. CHALK—generally favorable if it is a chalky limestone, not too pure; must have adequate thickness and strength.

13. CALCAREOUS SHALE—favorable; very good if it contains no disconformities and clay or sand streaks; should have a good limestone roof.

14. SILTSTONE—favorable if massive; usually strong and impervious.

15. SALT—favorable whether in massive beds or in salt domes.

16. ANHYDRITE—favorable; usually strong and impervious, must be thick-bedded.

17. DOLOMITE—favorable; similar characteristics to anhydrite and crystalline limestone.

18. QUARTZITE—favorable if mined below weathered, fractured zone and

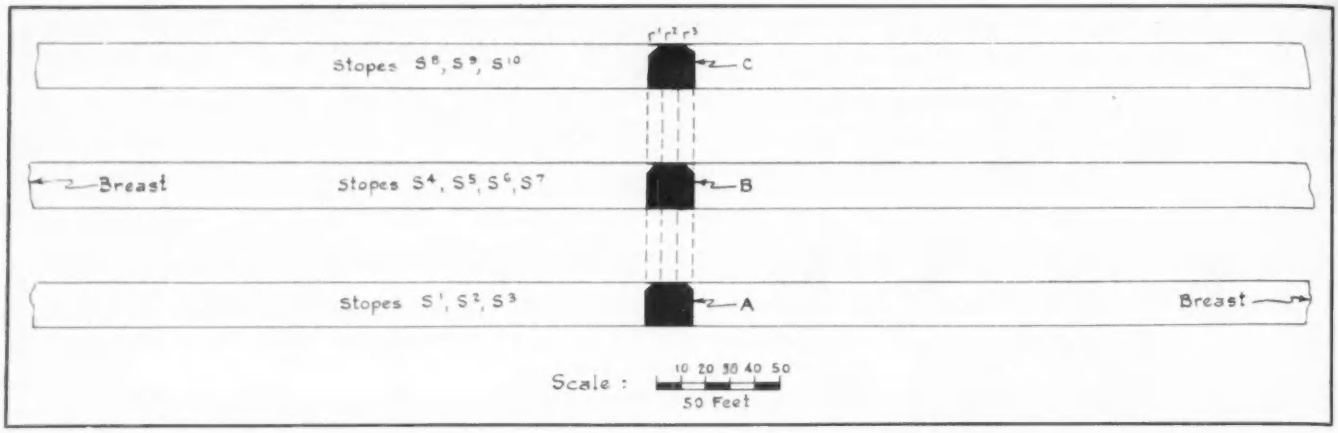


FIGURE 4

if it contains no weak, sandy horizons at cavern levels.

19. SCHIST—favorable, except for foliated and mica-schists; serpentine produced by the hydrothermal alteration of ultrabasic igneous rocks, such as in the Blue Ridge Mountains, especially attractive.

20. GRANITE—favorable if mined below weathered, fractured zone near surface; not considered as favorable as quartzite or non-foliated schist.

**Geological Problems.** In addition to studying strictly geological and structural engineering problems the underground storage geologist must be proficient in analyzing the other economic aspects of cavern location and construction. Since he makes the primary recommendation for a specific location, a knowledge of local restrictions in populated areas pertaining to mining, core-drilling, and other types of exploration may keep him from making serious mistakes. He must acquaint himself thoroughly with the ground water situation and its domestic use and with the character and thickness of the rock mantle.

A knowledge of comparative costs of various methods of cavern construction is essential if the geologist has a choice in any specified area. He may find upon thorough investigation that the bulkheading of an underground quarry or mine to obtain the size of chambers desired would cost more than blasting out a completely new cavern in hard rock. The problem involved in making an abandoned mine or cavern fluid tight may determine the feasibility of such a project.

The dissolution of massive rock-salt to create LPG storage chambers requires consideration of the following: In dissolving out a salt cavern fresh water is needed as a solvent. Power is needed to place the fresh water against the salt body and to take the brine to receiving and filter tanks. Salt water input pumps are necessary to force the brine into a salt-water sand in a disposal well. Since the operation is continuous, stand-by pumps should be in readiness and adequate fresh water must be available.

The injection well is usually of large diameter and is drilled as far into the salt as storage requirement demands or as far as salt beds are favorable. Casing is then cemented in a competent, impervious formation not far above the salt. The rate and controlled flow of fresh water against the wall of salt at various depths may be regulated by strings of tubing within the casing. It is possible that brine receiving and filter tanks may be combined. Since there is almost always a quantity of shale in stratified salt deposits, filters are necessary if the expended salt water is to be pumped back into a salt-water sand in a disposal well. It is conceivable that in the creation of salt dome caverns along the Gulf Coast, the mere pumping of fresh water into the injection well and the ejecting of brine into the Gulf of Mexico would greatly simplify the above mining technique.

**Geological Investigation.** When it is desired to establish LPG underground storage facilities for a metropolitan market, the engineering geologist is called in and given all details concerning the size of the market, both real and potential, the location of pipe lines and terminals, the approximate locality preferred for the storage cavern and the month and year facilities should be ready to receive propane or butane.

The order of geological investigation for any predetermined locality is more or less definite and falls into two principal categories: office and laboratory research and field investigation. The office work involves a thorough review of all published geological literature concerning the specific area in question. Especially important are the studies of topography, stratigraphy, structural and economic geology, and ground water conditions. Massive, highly-folded rocks of sufficient age and density in a hilly or mountainous area may presumably be mined through an adit penetrating the side of a hill or mountain horizontally. This would eliminate the much greater expense of digging a shaft and of hoisting rock waste two or three hundred feet.

The cleaning out and repairing of abandoned mines or underground quarries may obviate the necessity for creating new storage chambers. Usually the sites of recently abandoned workings are recorded in geological reports, but often the locations of old mines are found in no published technical literature. Hence the preliminary office investigation and general report is followed by reconnaissance field exploration, which results in a written, more specific report with recommendations for more intensive field surveys or core drilling, or both.

Complete physical and chemical laboratory analyses of cores and rock samples from outcrops and mining operations determine the permeability of the cavern rock, its hardness and strength to resist fracturing and crushing, its tendency to spall or disintegrate under mechanical motion of LPG, its organic content, and its solubility and chemical reaction with LPG. Geological investigation in the

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field, in addition to locating uncharted mines and caverns, determines such things as (1) texture and thickness of outcropping formations which will be found underground at the cavern site, (2) density and compaction of sediments, (3) character of bedding planes, (4) disconformities, (5) correlation and comparison of outcrops, (6) fracture and joint patterns, (7) weathering phenomena, and (8) miscellaneous data, such as color of rocks, mineral content, fossils observed, and the obvious chemical composition of the formations studied. It should be understood, however, that lateral changes in lithology occur frequently in some geological formations. Hence analyses of samples obtained from such strata at one locality should not be considered as adequate for the same formation at another locality many miles distant.

Subsequent to office, laboratory, and geological field investigations the company engineers and mining contractor take over. The underground storage geologist is consulted frequently, however, as new geological problems arise during mining operations. As the result of experience to date in various localities it may be said that mining techniques vary according to topographic relief, water problems, age and character of cavern rocks, and storage capacity desired. Figure 2, therefore, is an idealized plan for caverns constructed in areas of low relief and in massive horizontal rocks, such as limestone, dolomite, anhydrite, schist and quartzite. Dimensions of individual chambers in any project naturally depend on the character and thickness of the geological formation utilized. Except for relatively small amounts of LPG storage space desired or for storage in salt and the competent massive rocks mentioned above, rarely will a project consist of a single cavern or chamber. For shale, marl and other less competent rocks, usually thin-bedded, it is believed that a multiplicity of smaller interconnected chambers will be essential for the storage of large amounts of LPG at a single locality.

**Cavern Construction.** Before discussing the mining of storage chambers a few mining terms should be defined. A tunnel is a level underground passageway. An adit is a horizontal passage from the surface. A drift is an exploratory tunnel; a tunnel connecting other tunnels. A breast is the dead end or working end of a drift. A stope is a tunnel or chamber formed by a series of step-like excavations. A shaft is a vertical or inclined excavation of limited size reaching from the surface to the mine workings. A raise is a shaft driven upward from below.

In the idealized room-and-pillar mine shown in Figure 2, dimensions are calculated for a cavern mined in quartzite. It is designed for the most direct movement of rock waste to the shaft, and to minimize the hoisting distance the rock will be loaded at three levels. The maximum distance to the shaft from any point is approximately 175 feet. Subsequent to digging and lining the shaft and drilling vent holes, drifts are tunneled to the vent holes at the bottom level and raises are driven upward to the predetermined top level, say 48 feet in the quartzite mine designated by Figure 2. The cross-hatched portion represents undisturbed quartzite. Starting at the top level, the rock is blasted and removed in 6-foot "slashes," or steps, and moved through a top level drift to the shaft where it is hoisted to the surface.

The removal of 48 vertical feet of quartzite at the three levels would create a cavern with a capacity of approximately 2,030,000 cubic feet, or 362,500 barrels, including the shaft. Should it then be decided to increase this capacity, the best method would be to extend the cavern laterally at the bottom level and thus acquire the additional desired barrels of storage, figuring one barrel of storage for each 5.6 cubic feet of rock removed.

The mine shown in Figures 3 and 4 has no shaft. Development began by tunneling into the side of a granite mountain for a distance of more than 400 feet. The geologist had already determined through extensive surface exploration that a body of favorable non-foliated schist approximately 300 feet thick is present behind the granite and parallels the face of the mountain for several miles. Figure 3 is a cross-section through the adit. Open tunnels are shown in black. Ten crosscut stopes at right angles to drifts and parallel to the mountain front are indicated by $s^1$ to $s^{10}$. Then $r^1$, $r^2$, and $r^3$ are raises, 6 feet in diameter, extending back from the near side of adit drift 6 feet, 12 feet, and 18 feet, respectively, and 100 feet to top level. Drifts A, B and C and the 10 stopes all are approximately 18 feet square.

Figure 4 is a longitudinal section through the stopes and at right angles to drifts A, B and C, which bisect the stopes. This is the way the cavern would look to a person standing on the mine dump and looking into the mountain with X-ray vision. Exclusive of space occupied by bisecting drifts, each stope is 500 feet long. The storage capacity of each is 162,000 cubic feet, or 28,928 barrels. The capacity of stopes 600 feet long would be 194,400 cubic feet, or 34,714 barrels, and of stopes 700 feet long 226,800 cubic feet, or 40,500 barrels. The capacity of the three drifts—to the bulkhead in the adit—is 202,500 cubic feet, or 35,161 barrels. The capacity of the portion of the 6-foot raises unaccounted for equals 3.1416 x 9 x 180, or 5089 cubic feet, which amounts to 909 barrels. Thus the storage space in the mine, as shown in Figures 3 and 4, is approximately 1,827,560 cubic feet, or 326,350 barrels.

If it should be desired to increase the capacity of the cavern by as much as 25 to 30 percent after development

## About the Author

HAROLD S. THOMAS, regional research geologist with Phillips Petroleum Company, Bartlesville, Okla., has spent the last two years working on underground storage problems. He received his BS degree from the Missouri School of Mines and took graduate work at the University of Missouri and Northwestern University, Chicago. In addition to teaching at Rolla, Missouri, and Chicago his experience includes that of paleontologist for Tide Water Associated, chief geologist for the Slick-Urschel interests and an independent consulting geological-engineering practice. Articles he has written cover a long list of engineering and geological subjects.

has begun and before stoping has proceeded too far, and if tests and development show that a 32-foot thickness of rock between drifts A and B, and B and C is unnecessary for adequate strength and could safely be reduced to 20 feet, drifts B and C and cross-cuts $s^4$ to $s^{10}$ could be stoped downward to a height of 30 feet, instead of 18 feet. The increased volume of all the above-mentioned tunnels would amount to 40 percent, increasing the storage capacity of each of the 500-foot stopes to 40,500 barrels, the 600-foot stopes (if any) to 48,600 barrels, and the 700-foot stopes (if any) to 56,700 barrels.

The total capacity of the above-mentioned drifts and stopes—B and C and $s^4$ to $s^{10}$ (500 feet long), respectively—plus the original drift A and stopes $s^1$ to $s^3$, plus the uncalculated portion of the three raises, would then amount to 416,700 barrels, instead of 326,350 barrels, the mine capacity before the 40 percent increase in stoping depth of the upper workings was authorized. The main economic problem to decide is whether to obtain added volume by increasing the length of cross-cuts, thus increasing the distance to move rock waste, or by deepening and possibly weakening the entire cavern structure. It should be understood that the determination of dimensions and capacities must be worked out in advance of development as far as possible and that the character and strength of the rocks themselves are determinative factors in most operations.

The above examples of cavern construction in rocks favorable for underground storage indicate the type of work the underground storage geologist must qualify himself to do and the kind of knowledge he must possess if he is to make scientific locations and practical recommendations for storage chambers in many areas and in many kinds of rocks. The geology of underground storage is a composite of pertinent subjects taught in physical, structural, historical, engineering, mining, petroleum and economic geology courses. Some of the most useful geological phases of this new earth science include those branches called lithology, stratigraphy, sedimentation, mineralogy, petrology, geomorphology and dynamical geology. **—The End.**

# The Courts Say . . .

## in recent insurance cases

Shelton

*This column is to inform—not advise. It presents the current trend in legal thinking on insurance cases. The law varies from state to state and its application depends upon the facts of the particular case. Do not attempt to apply it without consulting your attorney.*

**JOSEPH M. SHELTON,** Attorney-at-Law, Dallas

### That rule violation does not bar compensation.

COMPANY RULES forbade drinking liquor on the job. Fellow worker offered employe a "gin" bottle which actually contained carbon tetrachloride. Employe took a drink and suffered severe injuries. Employer said employe's injuries were not compensable because he broke a rule for which he was subject to immediate dismissal.

**The court said** employe could recover because company rules fall into two categories: (1) Rules which limit the scope of employment; (2) Rules which direct the manner of work. Here employe violated a rule governing the manner of doing the work and it did not take him out of the course of his employment. To do otherwise would allow company rules to restrict the application of the compensation law.

*—Burns v. Merritt Engineering Co., 302 N. Y. 131, 96 NE 2d 739 (1951)*

### That it was a general injury and not just the foot and leg.

A HEAVY OBJECT fell, grazing the side of an employe's left leg and landed on top of his foot, knocking him down. He suffered direct injury to his foot and leg only. He complained upon maximum recovery, of a large corn under the big toe and pain in the toes, foot, leg, hip and lower back. The employe claimed general bodily incapacity as a result of the injury and that he was totally and permanently disabled. The insurance carrier alleged that the injury was confined to the left foot or at most the left leg.

**The court ruled** even if the injury itself is confined for a specific member of the body, if the effects of the injury extend to other portions of the body in such a way to cause disability, the injury then is a general injury and not a specific one. The trial judgment on the jury's verdict of total and permanent disability was affirmed.

*—Texas Employers Ins. Ass'n. v. Trapp, 258 SW 2d 112 (Tex. Civ. App.—Beaumont, 1953)*

### That worker was a "Texas Employe."

• ROUGHNECKS WORKED by the day in Texas for a drilling contractor. Crew was "bumped" and contractor said roughneck could be employed later on another well to be started in Texas. He worked for three other employers before contractor called him to work in New Mexico. He was injured within a year after leaving Texas. Roughneck sought compensation under the extra-territorial provision of the Texas Act.

**The Texas court indicated** that where employment is interrupted under an understanding of further employment of the same general character, the status of a "Texas Employe" for compensation purposes is preserved if the employe returns to work within a reasonable time even though in another state.

*—Hale v. Texas Employers Inc. Ass'n., 239 SW 2d 608 (Tex. Sup. Ct., 1951)*

# Better Roads, Fewer Traffic Accidents Help Industry

**Market demand for petroleum products is affected greatly by the condition of highways and streets. Consequently, the petroleum industry has a direct interest in highway and street problems, which are many and serious.**

Especially should the industry be concerned with safety of driving, by taking an active part in promotion of measures that would reduce accidents. Americans read in every day's newspapers about the sudden deaths, maiming, and destruction on highways and streets, or are made even more aware of the hazardous driving conditions by accidents of their own or relatives or friends.

Consequently, countless people dread driving and stay off the streets and highways as much as possible. Many visits and holiday and vacation trips are dreamed of but never made when consideration is given to traffic congestion, danger of accidents, and other discouraging driving conditions. Thereby, huge volumes of oils that people really want to buy are not actually bought. Some of this lost business doubtless would be gained, and the consumers would be made happier, by highway and street improvements, such as more signals, better lighting, wider bridges, fewer bad turns, speed limit enforcement, and divided highways instead of present roads where vehicles collide head-on in passing.

No serious problems are involved in determining what can and should be done to make the streets and highways safer and more efficient. The principal problems are those of paying for the improvements and distributing the costs equitably for everybody concerned. Equitable taxation for highway and street purposes requires much factual information and the wisdom of a judge.

To achieve fairness in paying costs of building and maintaining public roads is a very difficult problem. It involves, for example, the perennial controversy between drivers of automobiles and owners of trucks regarding use of the roads and taxes on such use. At the American Automobile Association annual meeting in Los Angeles recently, it was said that tens of thousands more miles of improved highways could be built with the same amount of money if highways did not have to be built to carry heavy trucks but only to standards adequate to carry automobiles. It was further charged that truckers strenuously oppose steps that would compel them to pay their fair share of road costs. One report denounced damage to roads by heavy trucks that pay "inadequate taxes in terms of roads costs they make necessary." Misuse of road funds also was deprecated.

For oil companies, truckers as well as motorists are customers, and the most oils will be sold if both of these groups get maximum benefit from their tax payments. Motorists should get as much for their tax money as possible, and they should not have to subsidize truck operations. At the same time, trucking has filled an obvious public demand, demonstrating a degree of economic soundness. And as truck operators pay taxes and fees, they are entitled to proper use of the roads they help pay for. The problem that is raised is what is fair to both the motorist and the trucker, as regards use of the roads and payment of the cost.

The present strong trend toward toll roads doubtless is very significant. Perhaps it is the practical answer to some of the problems of fairness to users of roads, offering some advantages over publicly financed and publicly used roads.

In its own direct interest, the petroleum industry needs to understand the problems of street and highway safety and efficiency and to help actively in solution of these problems.

# U. S. Disposing of Business Holdings

**Some progress is being made toward taking the U. S. government out of business and turning its industrial and other business facilities over to private interests.**

The federal government is disposing of synthetic rubber plants. The Department of Commerce recently sold the Federal Barge Line. About $250,000 federal housing units built in the World War II period are being liquidated.

The Eisenhower administration has sought Congressional permission to dispose of the huge General Aniline and Film Corporation, held by the Alien Property Custodian, and to sell or rent $34 million worth of facilities for manufacture of gasoline from coal, built during the war.

The Atomic Energy Commission is cooperating with Congress toward allowing private industry to participate in development of atomic power. Plans for new public power projects are being curtailed and private concerns are being encouraged to build the facilities involved.

A Navy clothing factory in Brooklyn has been closed down. The Army has taken out of operation a coffee roasting plant in Chicago, and the Marine Corps a similar plant in Philadelphia.

These moves to take the government out of business represent only a small beginning. Socialization was creeping upon the U. S. for 20 years, and gaining control of business by the government was a part of the socialization process. It may take years to complete a satisfactory job of divesting the government of its business holdings. Progress will be made difficult by entrenched paternalistic philosophy and accumulated mountains of red tape. It will be slowed down some by the administration's determination to protect the interests of the government and the taxpayers.

Government operations in the traditional field of private enterprise are against the interests of the people because they require the perennial use of billions of dollars of money raised by taxes.

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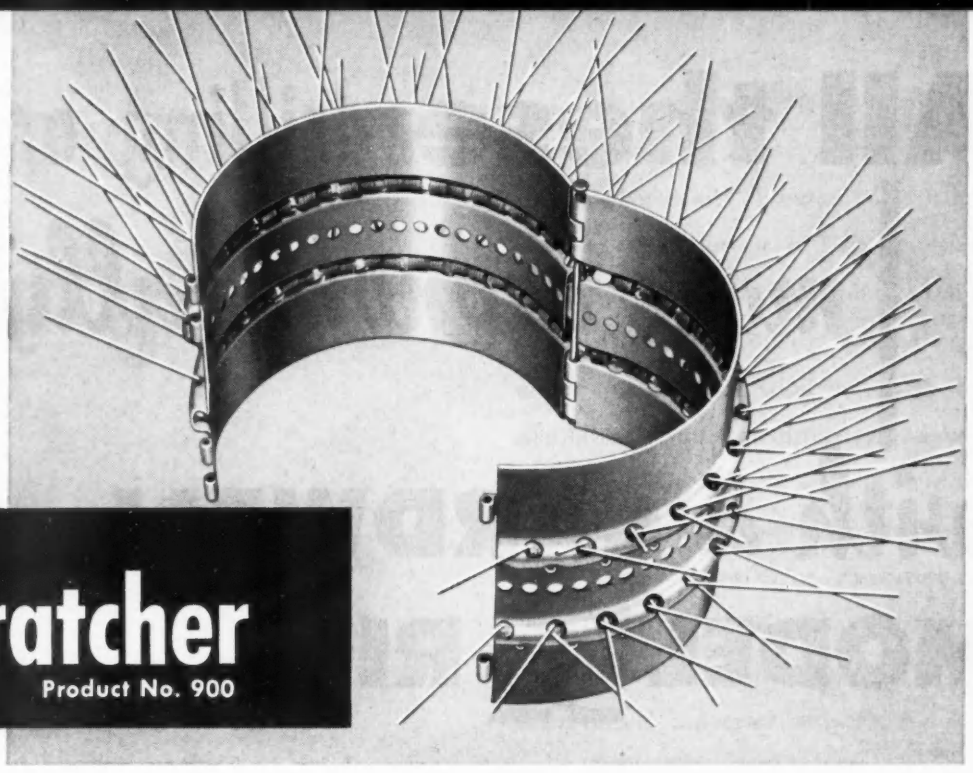

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The scratcher wires are pitched upward so that the scratcher can, first of all, be run to scratching depth without causing any significant disturbance of the mud cake. This feature is even more important during the actual hole-conditioning operation, because the up-pitched scratcher wires dig more firmly into the wall cake and are forced into a position of maximum reach and scratching efficiency whenever the casing is raised more than the distance between Stop Rings.

**QUICK FACTS** *about Baker Wall Scratchers*

1. Spring-loaded scratcher wires are pitched upward to dig firmly into mud cake with maximum reach and scratching efficiency on the upstroke during scratching operation.
2. During down-hole travel, up-pitched scratcher wires ride easily along surface of well bore and minimize scratching action.
3. Mud cake remains undisturbed until casing is raised more than distance between Stop Rings.
4. Scratchers reach scratching depth in good condition, with scratching efficiency unimpaired by excessive distortion of wires and springs.
5. Two rows of sturdy scratcher wires, crossed in pairs, assure full 360° scratching of more surface at each stroke; cut wall cake into smaller particles.
6. Scratcher wires are available in two lengths to meet the specific needs of slim-hole or regular programs.
7. Hinged for rapid, easy installation.

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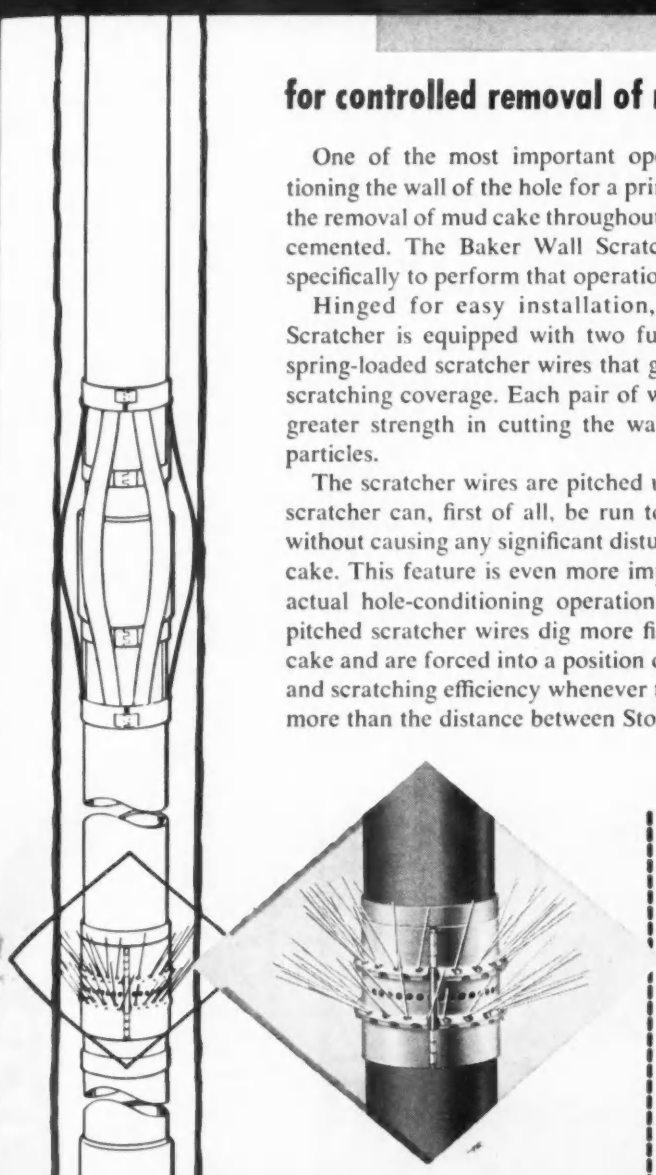

***Here is how controlled scratching works*** →

During down-hole travel, the up-pitched scratcher wires ride easily along the surface of the well bore so that no significant disturbance of the mud cake will result.

When the casing is lifted up out of the slips during the running-in operation, no scratching action occurs. Scratcher remains stationary until contacted by Stop Rings.

On each upstroke during the actual scratching operation, the crossed pairs of up-pitched scratcher wires dig firmly into the mud cake with maximum reach and scratching efficiency.

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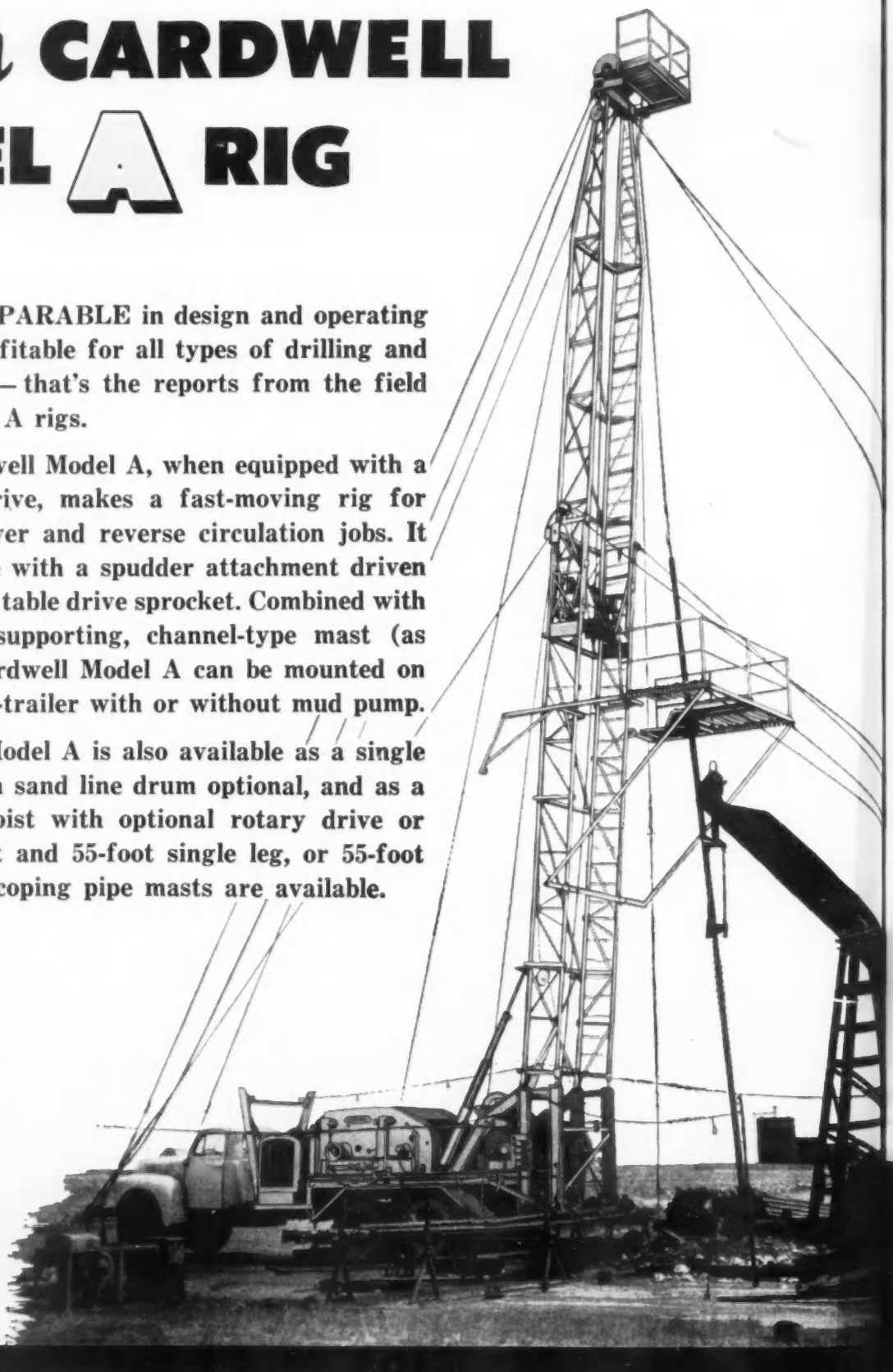
The Cardwell Model A is also available as a single drum hoist with sand line drum optional, and as a double drum hoist with optional rotary drive or spudder. 48-foot and 55-foot single leg, or 55-foot double leg telescoping pipe masts are available.



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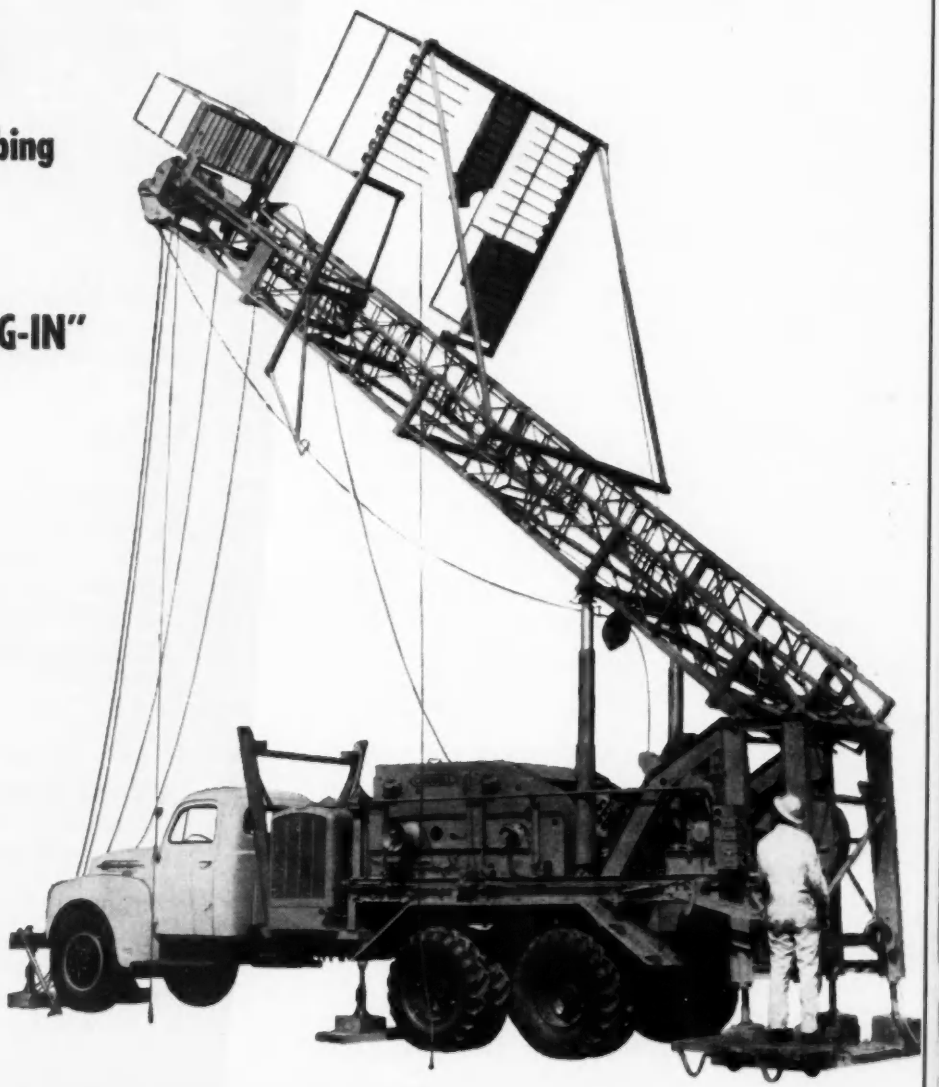

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By **RAY L. DUDLEY,** Publisher, and **WARREN L. BAKER,** Editor

# Output Must Be Curtailed

**EXCESSIVE OPERATIONS** during recent months have been carried to such an extreme that the industry is on the brink of serious market trouble. Despite peak consumption, supply has been in such huge quantity that stocks have been boosted above needs.

Consequently, crude production, refinery runs and gasoline output must be reduced during the next six months to avoid flooding the market. Present conditions indicate that:

- Crude production should not exceed 6⅓ million barrels daily, less than any time during 1953 except in May and 250,000 barrels below the yield in August.
- Refinery runs must be trimmed to under 7 million barrels daily, at least 150,000 barrels per day under August operations.
- In addition, refinery yields must be adjusted to produce less gasoline from the crude run through stills.

Unless the industry takes action to reduce its operations it appears certain to be faced with truly excessive inventories by the end of the winter, particularly in gasoline.

•

**THERE IS HOPE** that recent actions are an indication that the industry is inaugurating steps which will prevent conditions from getting out of hand.

Crude production will be lower during October. Several states have reduced their allowables. Texas' October allowable will be 80,000 barrels per day under September, which was 120,000 barrels below August. Louisiana, Oklahoma, and Kansas all took emergency action in mid-September to immediately reduce output in these states.

Meanwhile, many companies announced they were cutting down their runs to refineries.

These cutbacks in producing rates and refinery runs are almost too little and too late to undo the damage already created. Reductions should have been commenced two months ago. Failure of producers, refiners and importers to take a realistic view of inventory accumulations requires they now pay the penalty by enduring sharp reductions over a longer period of time.

•

**MAJOR TROUBLE** lies in the gasoline situation. Too much motor fuel has been manufactured by refiners. Despite record consumption, gasoline stocks have failed to experience normal drafts during the past summer motoring season. On September 12, inventories of motor fuel totaled 143½ million barrels, the same as at the end of July, and only 2½ million barrels under the close of June. Normally, the industry might take 10 to 12 million barrels of gasoline out of storage during this period.

It is customary for the industry to add approximately 45 million barrels to motor fuel inventories during winter months. This cannot be done during the coming winter, or stocks by next spring would be ruinous. Consequently, it behooves refiners to regulate their operations so only about 25 million barrels of gasoline will go to storage between now and next April 1. Even with this below-normal addition, gasoline stocks would total 168 million barrels next spring compared with 163 million barrels in April, 1953.

•

**OTHER STOCKS** also are high. Crude stocks are above 280 million barrels, 10 million more than at the beginning of the year and better than 15 million barrels above a year ago.

Distillate fuel oil stocks in mid-September totaled 125⅔ million barrels. Some additional amounts will go to tanks during the next month or two before cold weather increases the consuming rate. Distillate stocks reached a peak of only 122 million barrels last year. This assures an adequate supply for the coming winter. They would prove slightly high if the winter is milder than normal. Should a severe winter result, withdrawals from inventories could be replaced easily because of the enlarged refining capacity.

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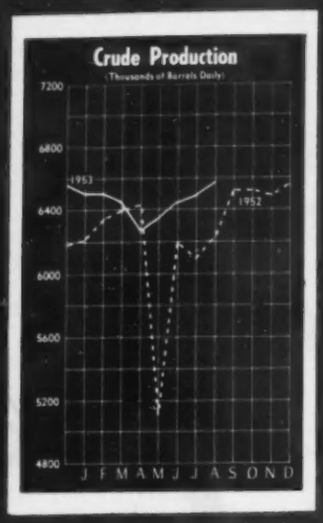
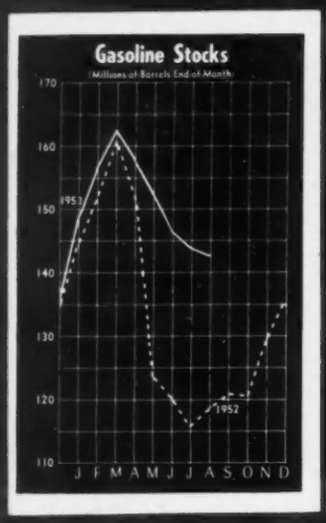
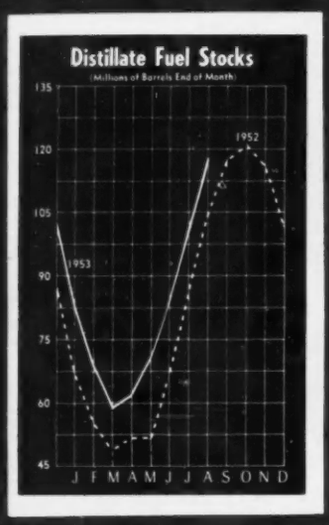
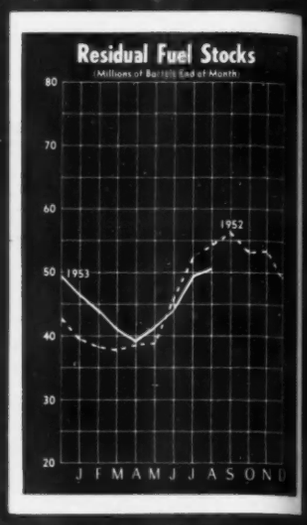
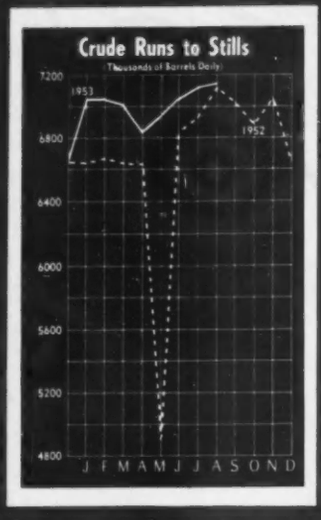
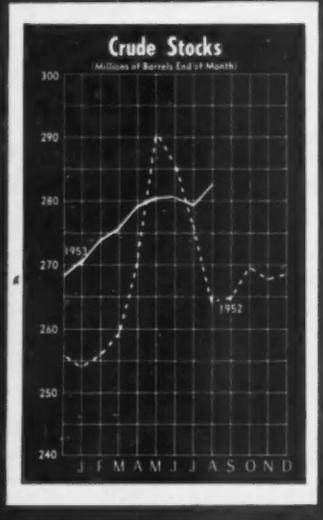


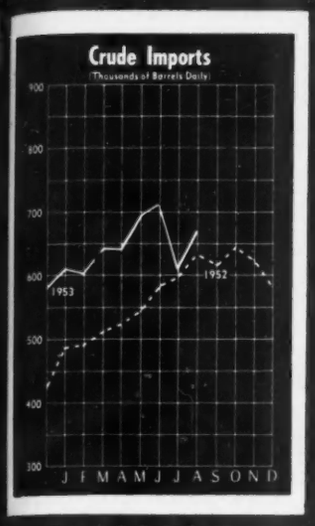

# Petroleum Trends in the U. S. . . .

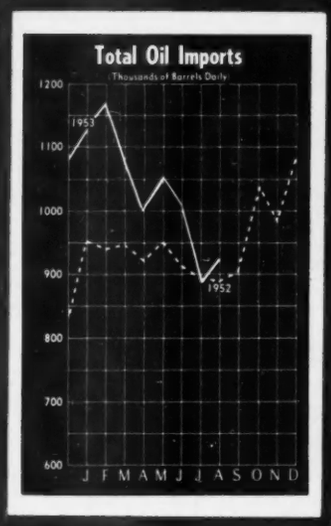
## . . . crude output reaches high for the year

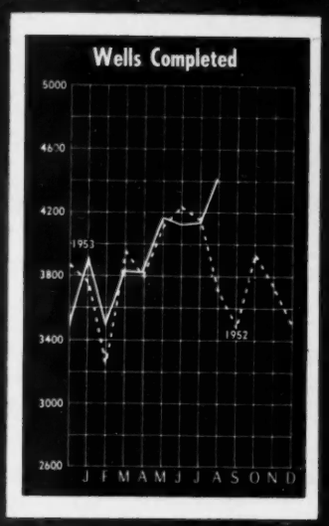
### *U. S. Crude Production by States*

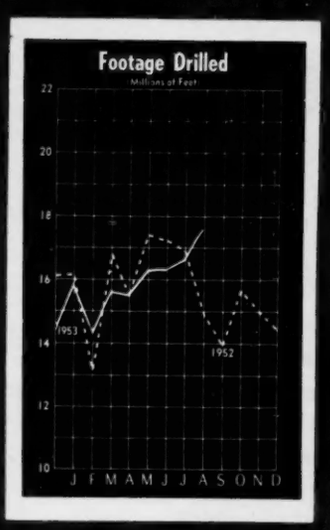
(Thousands of Barrels)

| STATE or DISTRICT | DAILY AVERAGE PRODUCTION August, 1953 | July, 1953 | August, 1952 | % Diff. August, '52-'53 | TOTAL PRODUCTION First Eight Months 1953 | 1952 | % Dif. '52-'53 |
|---|---|---|---|---|---|---|---|
| Alabama | 5.1 | 5.0 | 2.3 | +121.7 | 1,171 | 604 | + 93.9 |
| Arkansas | 77.7 | 77.1 | 79.4 | — 2.2 | 19,464 | 19,620 | — 0.8 |
| California | 1,007.6 | 1,016.1 | 979.9 | + 2.8 | 243,325 | 239,146 | + 1.7 |
| Colorado | 109.4 | 107.7 | 81.9 | + 33.6 | 21,866 | 19,051 | + 14.8 |
| Florida | 1.5 | 1.6 | 1.4 | + 7.1 | 364 | 406 | — 10.4 |
| Illinois | 163.7 | 159.7 | 157.0 | + 4.3 | 39,102 | 38,473 | + 1.6 |
| Indiana | 34.9 | 35.0 | 34.1 | + 2.3 | 8,781 | 7,897 | + 11.2 |
| Kansas | 325.7 | 323.9 | 322.8 | + 0.9 | 80,162 | 73,998 | + 8.3 |
| Kentucky | 31.2 | 30.7 | 30.9 | + 1.0 | 7,494 | 8,281 | — 9.5 |
| Louisiana | 704.3 | 697.9 | 665.0 | + 5.9 | 171,173 | 157,936 | + 8.4 |
| North Louisiana | 109.9 | 108.8 | 111.8 | — 1.7 | 27,671 | 28,418 | — 2.6 |
| South Louisiana | 594.4 | 589.1 | 553.2 | + 7.4 | 143,502 | 129,518 | + 10.8 |
| Michigan | 32.6 | 32.6 | 35.8 | — 8.9 | 8,151 | 8,998 | — 9.4 |
| Mississippi | 96.5 | 96.9 | 97.0 | — 0.5 | 23,878 | 24,152 | — 1.1 |
| Missouri | ..... | 0.1 | ..... | ..... | 13 | 15 | — 13.3 |
| Montana | 35.2 | 35.2 | 28.4 | + 23.9 | 7,737 | 5,968 | + 29.6 |
| Nebraska | 16.8 | 13.7 | 6.8 | +147.1 | 3,792 | 1,383 | +174.2 |
| New Mexico | 197.1 | 195.2 | 165.1 | + 19.4 | 46,030 | 37,931 | + 21.4 |
| New York | 12.3 | 12.4 | 11.5 | + 7.0 | 2,707 | 2,869 | — 5.7 |
| North Dakota | 14.4 | 14.1 | 6.8 | +111.8 | 3,517 | 530 | +563.6 |
| Ohio | 10.2 | 10.1 | 8.4 | + 21.4 | 2,297 | 2,111 | + 8.8 |
| Oklahoma | 555.4 | 542.7 | 532.3 | + 4.3 | 135,251 | 126,725 | + 6.7 |
| Pennsylvania | 27.6 | 27.5 | 29.8 | — 7.4 | 7,054 | 7,538 | — 6.4 |
| Tennessee | 0.1 | 0.1 | 0.1 | ..... | 8 | 7 | + 14.3 |
| Texas | 2,871.9 | 2,846.1 | 2,734.4 | + 5.0 | 694,220 | 663,526 | + 4.6 |
| Dist. 1—South Central | 39.7 | 38.5 | 33.3 | + 19.2 | 8,998 | 8,002 | + 12.4 |
| Dist. 2—Middle Gulf | 161.7 | 160.5 | 154.6 | + 4.6 | 38,812 | 37,769 | + 2.8 |
| Dist. 3—Upper Gulf | 476.6 | 474.8 | 468.9 | + 1.6 | 116,125 | 112,875 | + 2.9 |
| Dist. 4—Lower Gulf-S.W. | 274.8 | 271.5 | 249.2 | + 10.3 | 63,982 | 61,583 | + 3.9 |
| Dist. 5—East Central | 50.1 | 49.9 | 45.8 | + 9.4 | 12,065 | 13,462 | — 10.4 |
| Dist. 6—Northeast | 379.5 | 378.7 | 384.7 | — 1.4 | 92,600 | 94,911 | — 2.4 |
| Dist. 7-B—North Central | 119.8 | 117.7 | 97.9 | + 22.4 | 27,139 | 21,503 | + 26.2 |
| Dist. 7-C—West Central | 174.0 | 165.6 | 153.5 | + 13.4 | 40,498 | 33,432 | + 21.1 |
| Dist. 8—West | 931.3 | 927.9 | 937.8 | — 0.7 | 223,975 | 223,549 | + 0.2 |
| Dist. 9—North | 187.9 | 184.5 | 178.1 | + 5.5 | 44,006 | 39,031 | + 12.7 |
| Dist. 10—Panhandle | 76.5 | 76.5 | 82.1 | — 6.8 | 18,276 | 19,974 | — 8.5 |
| Utah | 4.8 | 4.5 | 5.0 | — 4.0 | 1,236 | 1,107 | + 11.7 |
| Virginia | 0.1 | 0.1 | ..... | ..... | 11 | 7 | + 57.1 |
| West Virginia | 8.5 | 8.4 | 6.5 | + 30.8 | 1,886 | 1,715 | + 10.0 |
| Wyoming | 243.6 | 233.6 | 196.7 | + 23.8 | 54,629 | 44,175 | + 23.7 |
| Total United States | 6,588.2 | 6,528.0 | 6,219.3 | + 5.9 | 1,585,319 | 1,494,169 | + 6.1 |




By CECIL W. SMITH, WORLD-OIL Staff

## Another new record for refinery operations . . .

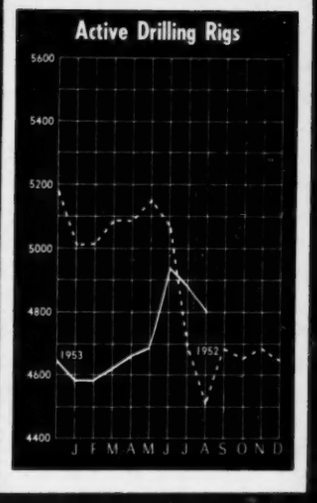
## . . . gasoline stocks could become excessive

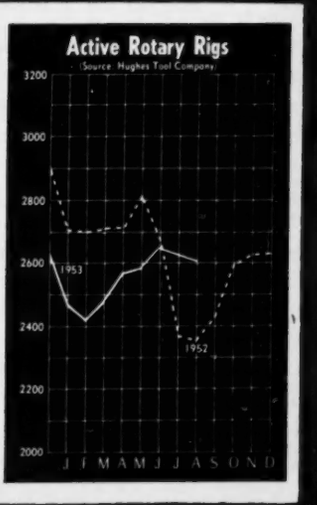
### *Crude Oil and Refined Products Trends*

(Thousands of Barrels)

| MONTH | CRUDE OIL | | | GASOLINE | | DISTILLATE FUEL | | RESIDUAL FUEL | | DAILY IMPORTS | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Production Daily | Runs to Stills Daily | Stocks End of Month | Production Daily | Stocks End of Month | Production Daily | Stocks End of Month | Production Daily | Stocks End of Month | Crude Oil | Total Oils |
| **1951:** | | | | | | | | | | | |
| July | 6,141 | 6,462 | 250,847 | 3,091 | 130,931 | 1,228 | 84,282 | 1,275 | 46,320 | 546 | 788 |
| August | 6,232 | 6,539 | 254,276 | 3,114 | 124,202 | 1,237 | 94,028 | 1,226 | 48,365 | 529 | 780 |
| September | 6,261 | 6,558 | 254,900 | 3,127 | 124,530 | 1,282 | 104,082 | 1,228 | 49,608 | 500 | 744 |
| October | 6,375 | 6,446 | 262,266 | 3,105 | 118,864 | 1,295 | 109,544 | 1,224 | 49,573 | 421 | 769 |
| November | 6,272 | 6,609 | 261,100 | 3,130 | 122,723 | 1,358 | 101,666 | 1,304 | 46,491 | 425 | 802 |
| December | 6,182 | 6,646 | 255,783 | 3,150 | 134,867 | 1,442 | 86,619 | 1,313 | 42,853 | 423 | 834 |
| **1952:** | | | | | | | | | | | |
| January | 6,217 | 6,640 | 254,007 | 3,094 | 144,339 | 1,456 | 66,969 | 1,338 | 39,523 | 488 | 951 |
| February | 6,367 | 6,673 | 255,900 | 3,109 | 151,912 | 1,528 | 55,369 | 1,322 | 38,295 | 491 | 940 |
| March | 6,388 | 6,640 | 259,126 | 3,069 | 160,689 | 1,400 | 48,750 | 1,274 | 37,971 | 510 | 947 |
| April | 6,429 | 6,435 | 270,679 | 2,995 | 151,890 | 1,312 | 51,634 | 1,253 | 38,561 | 539 | 922 |
| May | 5,107 | 4,905 | 290,813 | 2,295 | 123,656 | 982 | 51,648 | 979 | 38,821 | 545 | 951 |
| June | 6,197 | 6,825 | 285,964 | 3,169 | 120,166 | 1,455 | 65,911 | 1,228 | 45,688 | 581 | 911 |
| July | 6,093 | 6,927 | 275,951 | 3,295 | 116,566 | 1,475 | 85,775 | 1,237 | 52,245 | 597 | 892 |
| August | 6,219 | 7,118 | 264,368 | 3,377 | 118,592 | 1,514 | 104,257 | 1,252 | 54,061 | 632 | 879 |
| September | 6,518 | 7,017 | 264,723 | 3,428 | 120,991 | 1,502 | 117,252 | 1,230 | 56,200 | 615 | 932 |
| October | 6,518 | 6,883 | 269,776 | 3,301 | 120,062 | 1,458 | 120,721 | 1,203 | 53,052 | 643 | 1,037 |
| November | 6,487 | 7,049 | 267,852 | 3,416 | 129,509 | 1,510 | 116,096 | 1,299 | 53,069 | 624 | 984 |
| December | 6,634 | 6,952 | 271,928 | 3,361 | 136,028 | 1,509 | 99,582 | 1,302 | 48,706 | 603 | 1,165 |
| **1953:** | | | | | | | | | | | |
| January | 6,555 | 7,042 | 272,250 | 3,384 | 150,518 | 1,528 | 80,655 | 1,307 | 45,910 | 616 | 1,135 |
| February | 6,562 | 6,969 | 273,589 | 3,379 | 157,873 | 1,505 | 67,167 | 1,275 | 44,178 | 586 | 1,066 |
| March | 6,531 | 7,002 | 275,665 | 3,319 | 162,731 | 1,489 | 59,802 | 1,256 | 41,600 | 655 | 1,112 |
| April | 6,446 | 6,781 | 280,487 | 3,282 | 158,032 | 1,424 | 61,349 | 1,219 | 39,572 | 628 | 1,010 |
| May | 6,390 | 7,002 | 280,308 | 3,459 | 156,415 | 1,400 | 73,706 | 1,197 | 41,795 | 703 | 1,096 |
| June | 6,595 | 7,081 | 283,715 | 3,467 | 146,196 | 1,462 | 84,504 | 1,238 | 43,801 | 707 | 1,050 |
| July | 6,528 | 7,120 | 279,140 | 3,530 | 143,426 | 1,463 | 102,003 | 1,256 | 49,453 | 603 | 890 |
| August | 6,588 | 7,128 | 282,287 | 3,571 | 143,162 | 1,452 | 118,158 | 1,233 | 50,946 | 673 | 926 |
| **August, 1953 Change:** | | | | | | | | | | | |
| In Month | +60 | +8 | +3,147 | +41 | −264 | −11 | +16,155 | −23 | +1,493 | +70 | +36 |
| In Year | +369 | +10 | +17,919 | +194 | +24,570 | −62 | +13,901 | −19 | −3,115 | +41 | +47 |
| **Week Ended:** | | | | | | | | | | | |
| 9-12-53 | 6,506 | 7,216 | 280,865 | 3,511 | 143,487 | 1,463 | 125,664 | 1,259 | 51,760 | 598 | 946 |
| 9-13-52 | 6,460 | 7,059 | 264,350 | 3,447 | 117,296 | 1,484 | 108,641 | 1,218 | 53,274 | 612 | 861 |

**Source:** Data for last two months from API; prior monthly data from Bureau of Mines.



# U. S. Markets Shaky, Concern Over Crude Prices Indicated

**• U. S. petroleum markets showed considerable instability at mid-September.**

**• Retail gasoline price cutting was increasing in North Atlantic and New England states.**

**• Wholesale prices of gasoline at refineries were sagging.**

**• In all districts refineries were reducing crude runs to stills and gasoline production because of excessive stocks of gasoline, heating oil, and other products.**

Texas, Kansas, and Oklahoma oil fields were producing under reduced allowables in September, and further curtailment of crude output was in prospect, as allowable reductions for October were ordered in Louisiana and Texas and contemplated in other states.

Because of weakness of gasoline prices at wholesale and retail, there was some concern as to the future stability of crude prices, which were raised about 25 cents a barrel generally east of the Rockies in late June.

In the Perth Amboy area of New Jersey, some service stations cut gasoline prices two cents a gallon in advance of the Labor Day week end. In Pennsylvania there were price cuts of as much as 4 cents a gallon at some points, with price wars in progress at Reading, Altoona, York, and other places. Price cutting continued in New England. At Providence, Rhode Island, some stations cut their prices as much as seven cents a gallon.

The Louisiana Conservation Commission on September 16 ordered a reduction of about 27,000 barrels per day in that state's crude production allowable, effective October 1. The allowable had been 703,735 barrels daily in September. Commissioner John B. Hussey said the cut was based on amended nominations of purchasers for October. He expressed hope that "other states will also cut back and importers will take action to reduce oil imports." Hussey stated that the commission now is keeping statistical records "to check the veracity of purchasers' 'nominations' in the future, and also to make sure other states do not make up any reduction that is ordered in Louisiana's production.

Following its monthly statewide proration hearing September 18, the Texas Railroad Commission ordered a reduction in the Texas allowable for October, after having reduced quotas for September. The order for October cut the state's allowable 86,223 barrels per day, authorizing total Texas production of 2,904,409 barrels daily, by allowing fields in general to produce 19 days during the month.

Purchasers "nominations" or requests to buy Texas crude oil in October averaged 2,997,501 barrels daily, a decrease of 110,794 barrels from their previous nominations, the Railroad Commission had reported. The Texas allowables at mid-September averaged 2,990,632 barrels daily.

In anticipation of the Texas Railroad Commission's monthly statewide proration hearing September 18, Chairman Ernest O. Thompson indicated that the commision might again cut allowables in its order for October. "We are producing and importing more oil than we have actual demand for," he stated. "Also, we are making more gasoline than we are consuming and exporting."

"Crude oil in storage above ground as of August 29 was 282,711,000 barrels," Thompson said. "This is considerably higher than any witness testified as being necessary for adequate supplies above ground, and an increase of over 2 million barrels over the prior week and 13,567,000 barrels above the amount in storage the same period a year ago.

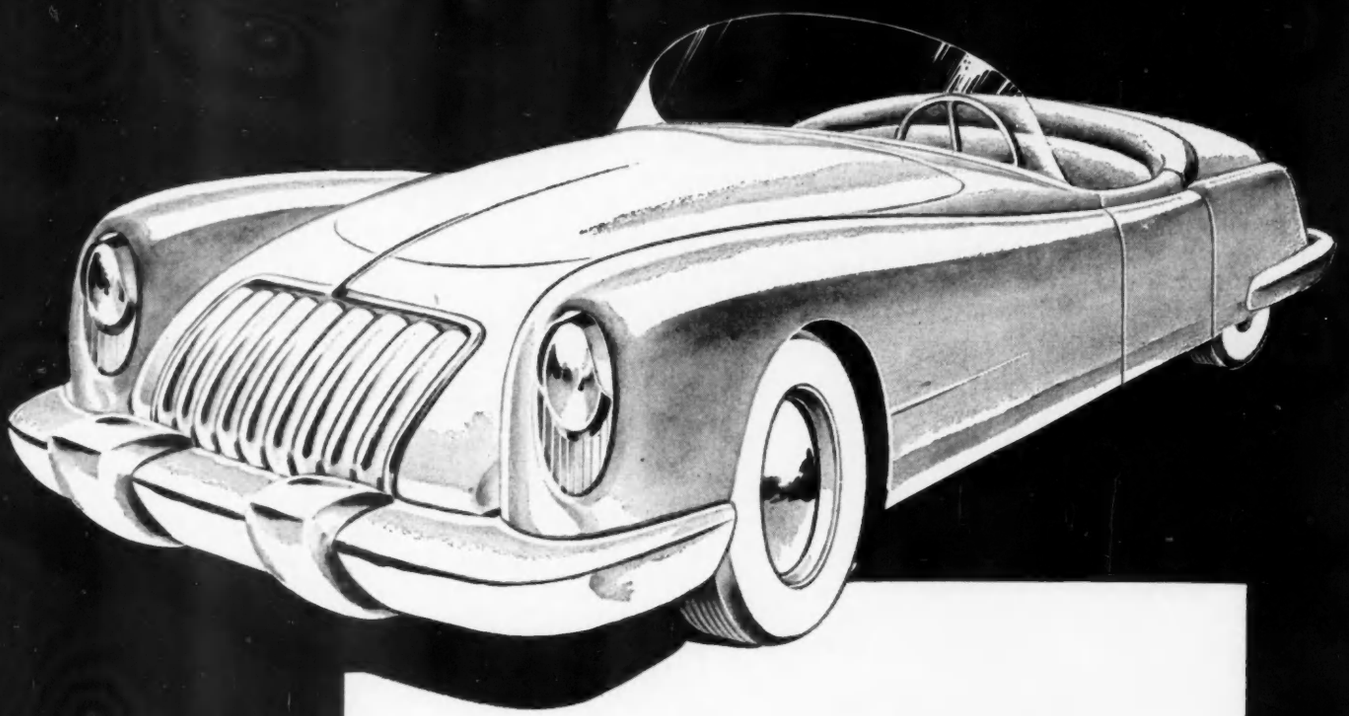
"Texas crude stocks stood at 132,916,000 barrels, which is up three million barrels over a year ago.

"When we made inquiry of purchasing companies as to what they considered ample stocks of crude, replies ranged from 255 million barrels to 275,600,000 barrels, which made a weighted average of 268 million barrels as the desired level of stocks for ample supply. Thus it would seem that present crude stocks are some 14.5 million barrels higher than the average opinion of industry as to what was needed, and higher than any testimony given.

"Gasoline stocks increased 953,000 barrels in the week ended August 29 to a total of 143,287,000 barrels," said Thompson, "which is 26 million barrels higher than the stocks a year ago; and it should be remembered that this is the end of the summer tourist season. It is striking to note that motor fuel stock—namely, gasoline—decreased only 136,000 barrels in August, which is the peak consuming period. A normal drop for that month should have been 5 to 5.5 million barrels. These figures should interest every oil producer."

The Texas Independent Producers and Royalty Owners Association at the middle of September sponsored a committee meeting in Austin and called on importing companies to hold down imports and asked other states to join with Texas in trimming crude production allowables. Kansas was the only state to join Texas in cutting allowables for September. But after the plea of the Texas independents for cooperation by other states, Oklahoma ordered a 20 percent reduction in allowables for the remainder of September, effective September 16. The Oklahoma Corporation Commission originally set the state's September allowable at 519,260 barrels daily, but some fields subsequently were running more because of shutdowns earlier in the year, boosting production to about 540,000 daily. Therefore, the new allowable for the remainder of September was about 432,000 barrels daily. A regular statewide hearing was due to be held in Oklahoma City September 29 to determine October allowables.

*Tomorrow's Tools - Today!*



## "that car looks like a million!"
## "uh-huh . . . wonder how it performs?"

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# Is the Skidding Coal Industry a Victim of Economic Forces?

**The coal mining industry continues to lose business to petroleum and natural gas, and coal producing companies and coal miners are unable to arrest the trend.**

Apparently, it is a matter of irresistable economic forces that the coal interests so far have been unable to stay by the business methods and competition employed.

The coal industry has been fairly progressive, especially in the past decade, in improving its operations. It has been alert to adoption of more efficient machinery and methods, and has helped develop more convenient stoking and handling equipment and sizing of coal. A recent innovation is the plan of a coal company to build a short pipe line in the Great Lakes area for transportation of coal from mine to electric power plants. The plan calls for mixing the coal with water and then removing the water after shipment.

The coal industry heretofore has been accused by some of being deficient in imagination, resourcefulness, and progressiveness. In comparison with the exceptionally alert and vigorous petroleum industry, the coal industry perhaps has been somewhat lacking in progressiveness. But there has been progress in coal mining and marketing, and the industry has become increasingly progressive.

A major problem that it has had and will continue to face is the fact that relatively large proportions of its costs are labor and transportation. Both of those items of cost are hard to hold down. The industry is trying to offset higher wages with savings through improved machinery and methods. But in the matter of transportation, the coal industry is at an inherent disadvantage in competition with petroleum and natural gas, since coal is a solid, while the competing liquid and gaseous fuels can be moved readily in pipe lines from points of production to points of consumption many miles away. At best, a pipe line for coal would be costlier to operate than one for oil or gas because of the processing of the coal before and after shipment.

The problem of the coal interests in meeting oil and gas competition is so difficult that they understandably deprecate imports of residual fuel oil and are discouraged by the great expansion of natural gas pipe line facilities. Joseph E. Moody, president of the Southern Coal Producers Association, said recently at Lexington, Ky., that coal was losing ground rapidly to natural gas, diesel oil, and fuel oil. He said that in order to save the coal industry, steps should be taken to stop "dumping" of foreign residual fuel oil in the U. S., restrict certain uses of natural gas, and increase the income tax depletion rate for coal mining. He said that in 1947 the bituminous coal industry produced 630 million tons, while this year the total likely will be only about 450 million tons. Use of coal by the railroads dropped, he said, from 120 million tons in 1943 to about 30 million tons in 1952.

It would be unfair to the consumers of fuels to restrict their supplies of oil and gas by artificial and arbitrary means and thereby force them to use more coal, at higher cost.

If the coal industry is to give top consideration to the public interest, it must eschew arbitrary restraints on competition and devote its competitive efforts to further improving methods, cutting costs, and holding down prices.

But of course, this is easier said than done. Perhaps coal, a solid, hard to dig up, hard to transport, and relatively inconvenient to use, is destined to continue indefinitely to lose business to oil and natural gas, which are easier to produce, transport, handle, and use. Coal has inherent handicaps that will seriously hold down its use as long as oil and gas remain plentiful, which may be for many years.

# 'Oil Is at Your Service,' America

**Thousands of oil men throughout the U. S. will participate in the many events to be held in local communities during the petroleum industry's sixth annual Oil Progress Week, October 11-17. For the observance, conservation is the theme, and the slogan is "Oil—at your service."**

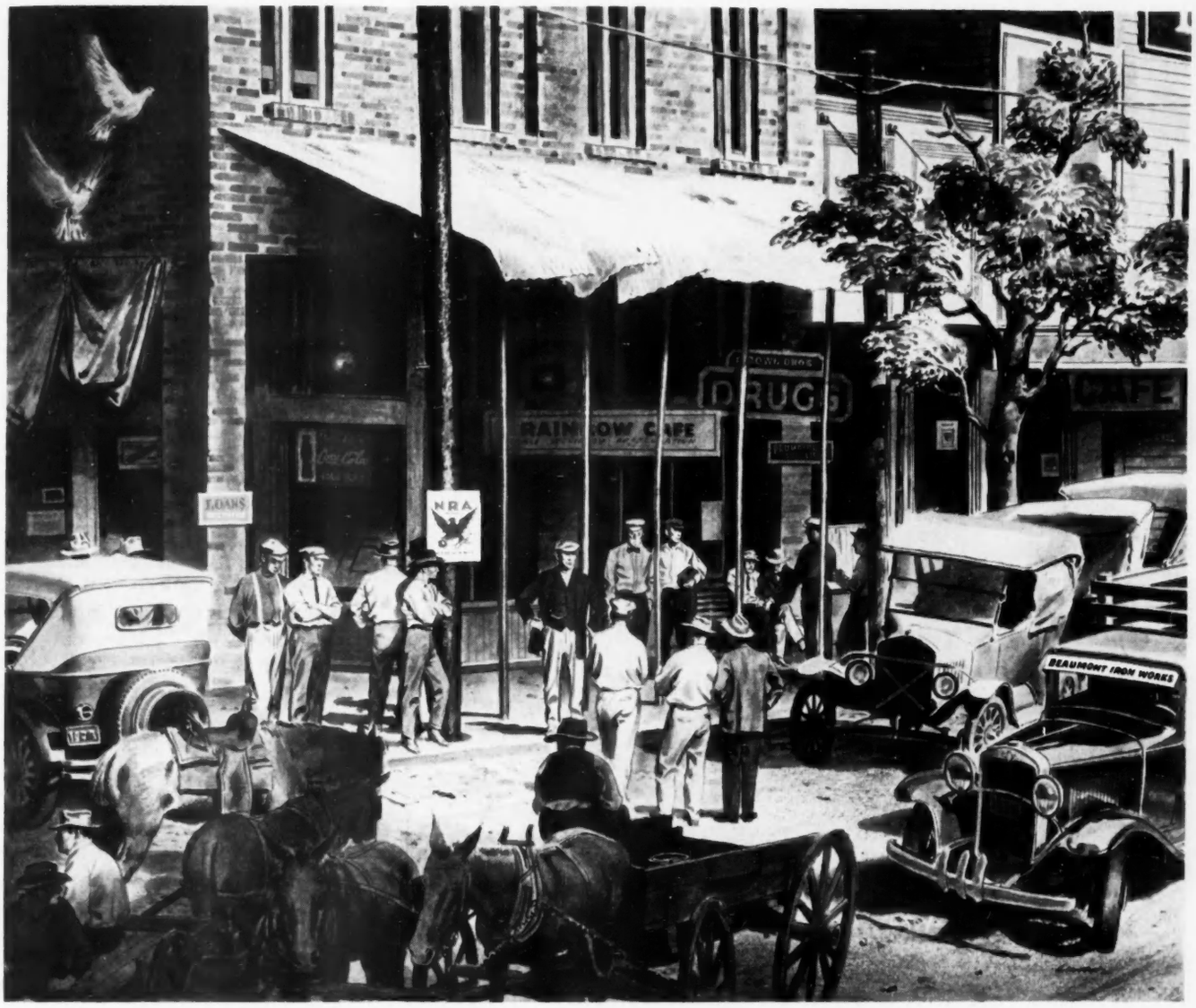
Industry representatives will make first-hand reports to their fellow townsmen on the progress of the oil industry in keeping the nation supplied with an abundance of petroleum products.

Particular emphasis will be placed on conservation—on what the industry is doing to obtain maximum benefits from its petroleum supplies, and on what steps it is taking to preserve these resources for future generations.

Reports will be made at luncheons, dinners, and other special gatherings. There will be special radio and television shows, exhibits, displays, open houses, parades, and special editions of newspapers. Pamphlets, booklets, leaflets, lapel buttons, banners, billboards, and many other special materials will help the oil men tell their story of progress and accomplishment. Service stations will be decorated with flags and bunting, and some will feature contests and displays.

The sole purpose of Oil Progress Week is promotion of public understanding of the industry. It is hoped that by inviting public attention to oil, the people will get a clearer picture of what free men and free competition are contributing to social and economic progress. The events will dramatize the industry and its operation and show what the industry is, what it does, and how it handles the growing problem of satisfying the American demand for more and more petroleum products.

A highlight of this year's observance will be the debut of the Oil Industry Information Committee's newest motion picture, which will be shown to thousands of persons at meetings, open houses, schools, luncheons, and dinners, and on television. The new motion picture is entitled "American Frontier." It is the story of the Williston Basin, in North Dakota—what happens when discovery of oil transforms a rural area into a whirlwind of oil activity.




# IN THE EAST TEXAS FIELD-WE DID OUR PART TOO

In the oil boom towns of East Texas in the Thirties, men made deals, scrambled after leases, and the storekeepers put up their Blue Eagles. And in the new oil fields, we at Beaumont Iron Works did our part, too. For BIW well head equipment was the overwhelming choice of oil men in East Texas.

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**ANOTHER LEADING OIL PRODUCING AREA WHICH HAS DEPENDED ON BIW EQUIPMENT.**

# The Big Moment . . .

**for R. E. (BOB) SMITH**

WHEN A YOUNG man borrows $25,000 from a stranger, offering no more security than an honest face—

And when he runs that $25,000 into one of the biggest fortunes owned by an independent oil man—

He might be expected to look back and say: "That was The Big Moment."

R. E. (Bob) Smith

But not R. E. (Bob) Smith of Houston. For him, that was just one of many times he has given the dice a fair shake in his great hand and watched them dance a tantalizing tango —and then come seven.

But the incident did put him into the oil business, and therefore deserves to be ranked with more spectacular occasions in his career.

Bob was working for a supply company that cold, cold day in little Tonkawa, Okla., when he overheard a man say he'd like to unload his two drilling rigs for $25,000 so he could return to a happier clime.

Smith got a five-day verbal option and the next day looked down into the bleak eyes of a bank president he had never seen before.

"I need $25,000."

"Security?"

"I've got a leather jacket and a pair of leather gloves."

The option had two days to run when Bob pocketed his $25,000.

Another big moment came on the day he and his partner decided to dissolve their $3 million holdings. Smith offered to buy or sell for $1½ million—"Or I'll flip you nickels."

The partner sold.

Still another was precipitated by a clouded title near Conroe. Smith was offered 40 acres in the Cockfield sand area, but he wanted the Conroe sand. He figured—and correctly—that the difference in the value of the leases would be $1 million or more.

"I'll flip you nickels," said Bob.

They met on the corner of Main and Rusk—one of Houston's busiest intersections—and a half dollar spun skyward in quest of a benediction from the gods.

"Tails," said Smith.

The coin bounced, rolled, settled. He looked down and received the fluttering salutation of the American eagle.

# Oil Imports Law to Remain Unchanged

**The U. S. oil imports situation will remain unchanged during the coming year, insofar as the effect of federal law is concerned.**

Before adjourning in August, Congress passed the "first" Simpson bill, H. R. 5495, providing for extension of the Reciprocal Trade Agreements Act to June 12, 1954, and setting up of a committee to study the whole international trade question during the coming year. The bill was signed by President Eisenhower about August 7. The study committee will include seven members appointed by the President, five Senators chosen by Vice President Nixon, and five members of the House of Representatives appointed by House Speaker Martin.

Tariffs on imported crude oil and petroleum products are based on the Venezuelan agreement, made by the executive department, with Department of State guidance, under authority of the Reciprocal Trade Agreements Act.

Efforts of independent oil producers and the coal interests to get Congress to impose limits on petroleum imports were unsuccessful. The "second" Simpson bill, H. R. 5494, calling for such restrictions, was sidetracked. By 242-to-161 vote, the House sent it back to the Ways and Means Committee, where it remained buried when Congress adjourned. That bill would have put restrictions on imports of farm products as well as oils, and would have increased duties on lead and zinc.

In its revised forecast for 1953, the U. S. Bureau of Mines estimates that U. S. petroleum imports will average 1,068,000 barrels daily, an increase of 110,000 barrels or 11.5 percent over the 958,000 daily of 1952. Crude oil imports are estimated at 655,000 barrels daily, up 82,000 barrels or 14.3 percent, and refined product imports at 414,000 barrels daily, up 30,000 barrels or 7.8 percent.

Total petroleum imports averaged 1,050,000 barrels daily in June, or 138,000 barrels (15.2 percent) more than in that month of 1952. This included new record imports of crude oil, averaging 707,000 barrels daily, up 38,000 from May, the previous record, 90,000 from April, 55,000 above March, and 126,000 above June of 1952. Residual fuel oil imports averaged 318,000 barrels daily in June, down 58,000 from May, but up 20,000 from June of last year.

# Big Saving Due

**U. S. motorists will save $4½ billion annually, on the basis of present gasoline consumption and prices, when automobile engines have a 12-to-1 compression ratio and use 100 octane gasoline.**

Also "saved" will be a huge volume of reserves of crude oil, from which gasoline comes.

Cracking units at refineries, first installed in 1913, similarly have "saved" 40 billion barrels of crude oil that did not have to be produced to get gasoline needed.

# He Knows!

EXPERIENCE is the truest guide to production efficiency and economy... and experience in the oil fields proves that Roebling wire rope is your one top choice for avoiding delays, cutting down replacements and saving wire rope dollars.

**ROEBLING**
A subsidiary of The Colorado Fuel and Iron Corporation

DISTRIBUTED BY
THE NATIONAL SUPPLY COMPANY • REPUBLIC SUPPLY COMPANY

## • U. S. Wells Completed in August and First Eight Months, 1953

| STATE or DISTRICT | NEW WELLS COMPLETED AND FOOTAGE DRILLED | | | | | | | | | | | DETAILS FOR JANUARY-AUGUST | | | | | Rigs in Operation | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | TOTAL NEW WELLS | | | | New Wells | | | Footage | | | | |
| | Oil | Dist. | Gas | Dry | Water Input | Gas Input | Water Disposal | Aug., 1953 | July, 1953 | Aug., 1952 | Total Footage August, 1953 | 1953 | 1952 | Percent Diff. | 1953 | 1952 | Aug. 31, 1953 | July 31, 1953 | Aug. 31, 1952 |
| Alabama | 1 | | | 10 | | | | 11 | 10 | 5 | 64,560 | 70 | 43 | + 62.8 | 362,623 | 251,629 | 8 | 7 | 7 |
| Arizona | | | | | | | | | 1 | | | 6 | 1 | +500.0 | 19,960 | 3,544 | 3 | 3 | 5 |
| Arkansas | 28 | | | 20 | | | | 48 | 59 | 38 | 162,620 | 313 | 266 | + 17.7 | 1,113,819 | 980,792 | 51 | 36 | 43 |
| California | 180 | | 8 | 58 | | | | 246 | 181 | 219 | 1,116,918 | 1,726 | 1,674 | + 3.1 | 7,481,180 | 7,012,356 | 257 | 260 | 237 |
| Colorado | 39 | | 4 | 45 | | | | 88 | 74 | 49 | 475,938 | 450 | 283 | + 59.0 | 2,288,936 | 1,534,539 | 46 | 63 | 43 |
| Florida | | | | 3 | | | | 3 | 2 | | 21,578 | 23 | 6 | +283.3 | 135,017 | 39,081 | 5 | 4 | |
| Georgia | | | | 1 | | | | 1 | | | 1,940 | 4 | | | 9,748 | | 4 | 3 | 1 |
| Idaho | | | | | | | | | 2 | | | 4 | | | 22,748 | | 1 | | 3 |
| Illinois | 93 | | 2 | 121 | | | | 216 | 174 | 251 | 587,345 | 1,273 | 1,321 | — 3.6 | 3,223,616 | 3,239,021 | 234 | 229 | 175 |
| Indiana | 38 | | 2 | 75 | 1 | | | 116 | 160 | 128 | 184,550 | 861 | 858 | + 0.3 | 1,472,588 | 1,528,870 | 179 | 200 | 132 |
| Kansas | 193 | | 39 | 201 | | | 3 | 436 | 335 | 257 | 1,520,395 | 3,128 | 2,883 | + 8.5 | 10,824,186 | 10,013,521 | 452 | 466 | 408 |
| Kentucky | 49 | | 15 | 66 | | | | 130 | 105 | 100 | 239,969 | 766 | 773 | — 0.9 | 1,508,690 | 1,598,401 | 103 | 101 | 84 |
| Louisiana | 109 | 2 | 23 | 90 | | | | 224 | 224 | 203 | 1,663,641 | 1,627 | 1,521 | + 7.0 | 11,696,955 | 10,213,533 | 247 | 248 | 205 |
| North Louisiana | 44 | | 9 | 38 | | | | 91 | 97 | 117 | 401,527 | 689 | 826 | — 16.6 | 2,564,322 | 3,120,482 | 59 | 67 | 60 |
| South Louisiana | 65 | 2 | 14 | 52 | | | | 133 | 127 | 86 | 1,262,114 | 938 | 695 | + 35.0 | 9,132,633 | 7,093,051 | 188 | 181 | 145 |
| Maryland | | | 2 | | | | | 2 | | 4 | 7,416 | 4 | 29 | — 86.2 | 15,614 | 113,209 | 1 | 3 | 13 |
| Michigan | 27 | | 2 | 38 | | | | 67 | 61 | 57 | 165,212 | 398 | 444 | — 10.4 | 1,043,247 | 1,192,739 | 100 | 90 | 90 |
| Mississippi | 10 | 1 | 2 | 18 | | | | 31 | 44 | 32 | 211,768 | 258 | 236 | + 9.3 | 1,790,301 | 1,701,633 | 39 | 30 | 32 |
| Missouri | | | | 2 | | | | 2 | 2 | 2 | 991 | 17 | 25 | — 32.0 | 14,393 | 26,941 | | 4 | 3 |
| Montana | 16 | | | 10 | | | | 26 | 45 | 28 | 114,182 | 262 | 159 | + 64.8 | 1,203,042 | 491,421 | 72 | 65 | 67 |
| Nebraska | 8 | | 2 | 15 | | | | 25 | 33 | 43 | 120,903 | 222 | 142 | + 56.3 | 1,149,443 | 712,804 | 21 | 19 | 14 |
| Nevada | | | | 1 | | | | 1 | | | 1,465 | 7 | | | 10,515 | | 1 | 1 | 1 |
| New Mexico | 39 | 2 | 51 | 18 | | | | 110 | 153 | 71 | 650,079 | 961 | 737 | + 30.4 | 5,468,070 | 4,097,105 | 208 | 196 | 169 |
| New York | 57 | | | | 37 | | | 94 | 87 | 128 | 131,254 | 611 | 695 | — 12.1 | 853,779 | 965,827 | 115 | 109 | 126 |
| North Carolina | | | | 1 | | | | 1 | | | 1,570 | 1 | | | 1,570 | | | | |
| North Dakota | 16 | | | 10 | | | | 26 | 20 | 5 | 181,517 | 164 | 33 | +397.0 | 1,254,513 | 303,317 | 29 | 27 | 28 |
| Ohio | 42 | | 17 | 35 | | | | 94 | 81 | 83 | 175,475 | 646 | 636 | + 1.6 | 1,316,941 | 1,378,472 | 187 | 187 | 171 |
| Oklahoma | 439 | 1 | 30 | 258 | | | 4 | 732 | 565 | 518 | 2,574,885 | 4,784 | 3,860 | + 23.9 | 16,878,773 | 14,612,194 | 568 | 601 | 540 |
| Pennsylvania | 73 | | 11 | 3 | 63 | 11 | | 161 | 145 | 160 | 275,887 | 1,085 | 1,127 | — 3.7 | 1,879,550 | 1,913,579 | 290 | 283 | 286 |
| South Dakota | | | | 6 | | | | 6 | 3 | | 32,002 | 14 | 2 | +600.0 | 70,258 | 12,413 | 2 | 7 | 2 |
| Tennessee | | | | | | | | | | | | | | | | | | | 5 |
| Texas | 706 | 22 | 69 | 560 | 4 | | 2 | 1,363 | 1,442 | 1,209 | 6,483,533 | 11,212 | 12,359 | — 9.3 | 51,404,860 | 59,771,703 | 1,226 | 1,299 | 1,293 |
| Dist. 1—South Central | 29 | | | 31 | | | | 60 | 62 | 56 | 223,745 | 542 | 479 | + 13.2 | 1,779,087 | 1,404,672 | 27 | 38 | 33 |
| Dist. 2—Middle Gulf | 19 | 3 | 14 | 30 | | | | 66 | 53 | 66 | 447,919 | 520 | 564 | — 7.8 | 3,235,162 | 3,562,764 | 43 | 42 | 46 |
| Dist. 3—Upper Gulf | 48 | 7 | 9 | 54 | | | | 118 | 154 | 120 | 819,602 | 1,089 | 1,196 | — 9.0 | 7,369,607 | 7,938,723 | 124 | 136 | 114 |
| Dist. 4—Lower Gulf-S.W. | 69 | 12 | 13 | 72 | | | | 166 | 149 | 116 | 954,184 | 1,246 | 1,140 | + 9.3 | 7,182,640 | 6,051,127 | 79 | 104 | 89 |
| Dist. 5—East Central | 8 | | 1 | 9 | | | | 18 | 19 | 33 | 73,587 | 199 | 244 | — 18.5 | 793,105 | 1,230,034 | 11 | 13 | 19 |
| Dist. 6—Northeast | 11 | | 2 | 22 | | | | 35 | 52 | 32 | 220,466 | 324 | 379 | — 14.5 | 1,922,420 | 2,330,845 | 42 | 48 | 29 |
| Dist. 7-B—North Central | 125 | | 1 | 125 | | | 1 | 252 | 280 | 188 | 863,850 | 2,074 | 1,888 | + 9.9 | 6,769,583 | 6,013,614 | 156 | 138 | 129 |
| Dist. 7-C—West Central | 61 | | 2 | 47 | | | | 110 | 115 | 145 | 586,598 | 930 | 1,491 | — 37.6 | 4,592,116 | 8,814,147 | 121 | 120 | 181 |
| Dist. 8—West | 150 | | 1 | 45 | | | | 196 | 196 | 171 | 1,123,864 | 1,488 | 2,364 | — 37.1 | 8,523,024 | 13,982,881 | 325 | 339 | 288 |
| Dist. 9—North | 157 | | | 118 | 4 | | 1 | 280 | 318 | 237 | 965,075 | 2,461 | 2,167 | + 13.6 | 8,186,920 | 7,015,405 | 215 | 248 | 281 |
| Dist. 10—Panhandle | 29 | | 26 | 7 | | | | 62 | 44 | 45 | 204,643 | 339 | 447 | — 24.2 | 1,051,196 | 1,427,491 | 83 | 73 | 84 |
| Utah | 1 | | 1 | 3 | | | | 5 | 8 | 11 | 17,215 | 55 | 44 | + 25.0 | 307,312 | 290,802 | 19 | 17 | 34 |
| Washington | | | | | | | | | | | | | | | | | 1 | 1 | |
| West Virginia | 7 | | 43 | 16 | | | | 66 | 49 | 58 | 188,127 | 420 | 403 | + 4.2 | 1,182,986 | 1,204,099 | 209 | 204 | 210 |
| Wyoming | 49 | | 7 | 27 | | | | 83 | 87 | 63 | 415,892 | 498 | 408 | + 22.1 | 2,517,990 | 2,065,397 | 119 | 115 | 81 |
| Total United States | 2,220 | 28 | 330 | 1,711 | 105 | 11 | 9 | 4,414 | 4,152 | 3,722 | 17,788,827 | 31,870 | 30,968 | + 2.9 | 128,523,223 | 127,268,942 | 4,797 | 4,878 | 4,508 |
| Total Western Canada | 139 | | 34 | 102 | | | | 275 | 317 | 202 | 1,088,277 | 1,424 | 1,197 | + 19.0 | 5,901,772 | 4,991,348 | 199 | 179 | 159 |

# New Completions Record . . .

**August's 4414 greatest ever recorded in single month; 8-months' total highest in history.**

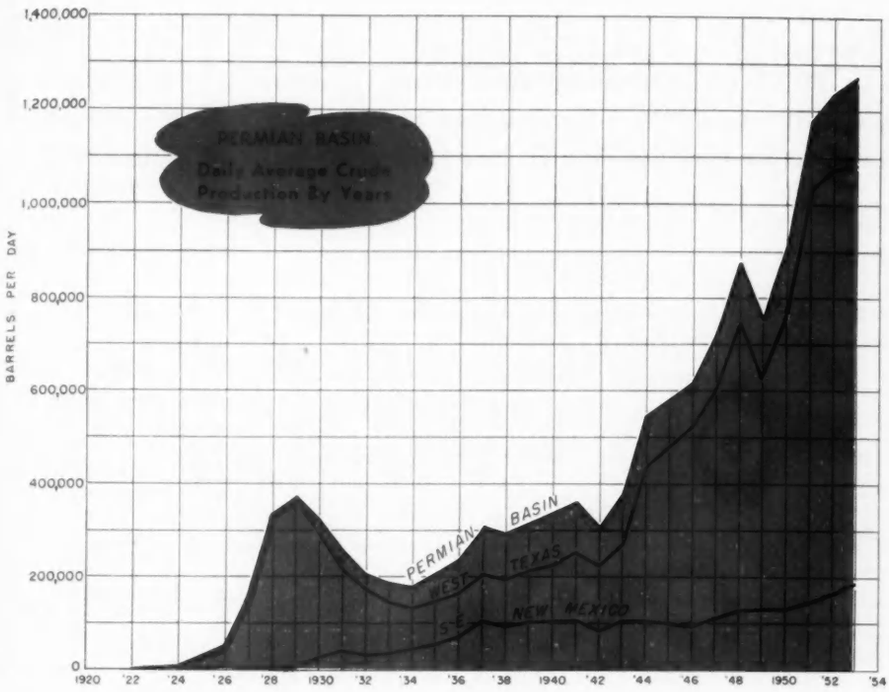
DRILLING ACTIVITY in the U. S. continued its record-breaking wave during August, resulting in the greatest number of completed wells ever recorded in a single month, and pushing the year's eight months total to the highest point in history. This year's drilling has continued to lead last year's by a slight margin, but the difference began to widen during August, for it was during that period last year that the steel strike's crippling effects on drilling were first being felt.

A total of 4414 new wells was completed during August to set the new monthly mark. A month earlier the count had been 4152, and a year before new wells had been lowered to 3722 by steel shortages. Therefore, at the end of eight months, this year's wells totaled 31,870 which were 902 more than the count at the same time last year. That amounted to a gain of 2.9 percent, while a month earlier the margin of difference amounted to only 0.6 percent.

Total footage drilled this year was 128,523,223 feet, while last year at the same time the agregate was 127,268,942. That shows a gain of 1.0 percent for this year's drilling operations. It also shows that each new well averaged 4033 feet in depth, which was 77 feet less than the 4110-foot average drilled in last year's first eight months.

Usually Texas' activity is a very good barometer of operations in the nation as a whole. However, this year finds Texas' wells totaling 9.3 percent less than last year's, while the U. S. boasts of a rise of almost 3 percent. Actually, Texas' 11,212 new wells numbered 1147 less than the 12,359 completed a year before.

Practically all of the other leading drilling states have experienced hikes in activity this year over last. The No. 2 area, Oklahoma, managed to boost its completed wells 23.9 percent from 3860 to 4784. California has been more in line with the U. S. as a whole, with its wells gaining 3.1 percent to 1726.




# Production Is High In the Permian Basin

**• Nation's third largest producing province yields approximately 1¼ million barrels daily.**

**• It could produce and transport several hundred thousand barrels more if the markets existed.**

**By L. J. LOGAN,** WORLD OIL Staff

THE PERMIAN BASIN of West Texas and Southeast New Mexico is the third largest major oil producing province of the U. S., accounting for approximately a fifth of the national output.

In the week ended August 29, the Permian Basin produced crude oil and lease condensate at the average rate of 1,308,300 barrels daily. That was 19.8 percent of the U. S. total of 6,620,700 barrels daily.

The basin was outranked in production only by the greater Mid-Continent and the Gulf Coast. The Mid-Continent in the week of August 29 averaged 1,942,150 barrels of production per day, or 29.3 percent of the national total. Contributing to this production were the Texas Railroad Commission's Districts 1, 5, 6, 7-B, 9, and 10, North Louisiana and Arkansas, Oklahoma, Kansas and Missouri, and Eastern Nebraska.

The Gulf Coast produced 1,612,250 barrels daily in the week ended August 29. That constituted 24.3 percent of the total U. S. production. The region included Texas Districts 2, 3 and 4, South Louisiana, Mississippi, Alabama, and Florida.

Outranked by the Permian Basin was California, the fourth region with production above 1 million barrels daily. California output averaged 1,005,600 barrels daily in the week of August 29. That was 15.2 percent of all U. S. production.

With output more than 100,000 barrels a day higher than a year ago, the Rocky Mountain region is assuming increased importance in the national oil picture. Its 430,700 barrels a day of output in the week of August 29 represented 6.5 percent of the U. S. total. This region includes Colorado, Utah, Northwest New Mexico, Western Nebraska, Wyoming, Montana and North Dakota.

The above five major regions accounted for 95.1 percent of total U. S. production. The Middle West's 269,050 barrels daily was 4.1 percent, and the Appalachian district's 52,650 barrels per day was 8/10 of 1 percent of the U. S. total.

The Permian Basin's production of 1,308,300 barrels daily in the week ended August 29 included 1,302,650 of crude and 5,650 of lease condensate. The total included 195,850 in New Mexico, consisting of 195,050 of crude and 800 of lease condensate, and 1,112,450 total in West Texas, of which 1,107,600 was crude and 4850 was condensate. The West Texas total included 177,550 daily for District 7-C, of which 173,350 was crude and 4,200 condensate, and 934,900 daily for District 8, composed of 934,250 of crude and 650 of condensate.

For the month of September the production of the Permian Basin was reduced somewhat, in line with a general lowering of allowables in Texas in restricting output to market demand. It is here estimated that production of the whole basin will average approximately 1,251,000 barrels daily for September. This will include 197,000 daily in Southeast New Mexico and 1,054,000 daily in West Texas, consisting of 165,300 in District 7-C and 888,700 daily in District 8. The volumes of lease condensate included in these totals are about the same as for the week ended August 29, as given above.

The current production is fairly close to the daily average for the first nine months of 1953, which is approximately 1,275,000 barrels daily for the whole Permian Basin.

The highest level so far reached by the region was that of November,

**Since it began producing oil in 1922, the Permian Basin has produced more than 4.8 billion barrels, including 4 billion in West Texas and more than 800 million in New Mexico. The basin's cumulative production is increasing at rate of almost 40 million barrels per month.**

1952, when the output averaged approximately 1,404,000 barrels daily. In October, 1952, the basin's production averaged 1,362,000 barrels daily, and in September, 1952, it was 1,337,000. The estimated 1,251,000 barrels daily for September, 1953, would be a decrease of 8 percent from that month a year ago.

Permian Basin production could be increased several hundred thousand barrels per day above current output if there were a market for the oil. The district could produce such additional oil without damage to the reservoirs, and existing pipe lines could handle the extra crude. Total pipe line outlet exceeded 1,600,000 barrels daily after completion during the past year of the large new lines of the Rancho Pipe Line System to Houston and the West Texas Gulf Pipe Line Company system to Beaumont and to Longview and points east. Capacity of these two new systems eventually will be increased considerably, boosting the basin's outlet to almost 2 million barrels daily.

Since it began producing oil in 1922, the Permian Basin has produced more than 4.8 billion barrels, including 4 billion in West Texas and more than 800 million in New Mexico. The basin's cumulative production is being increased at the rate of almost 40 million barrels per month or close to ½ billion barrels per year.

—The End

**Permian Basin Compared with Other Regions of U. S. in Crude Oil Production**

(Daily Average Production in Week Ended August 29, 1953)

| REGION | Barrels Daily | % of U.S. |
|---|---|---|
| Mid-Continent (Tex. Dists. 1, 5, 6, 7-B, 9, 10; N. La.-Ark.; Okla.-Kans.-Mo.; E. Neb.) | 1,942,150 | 29.3 |
| Gulf Coast (Tex. Dists. 2, 3, 4; S. La.; Miss.; Ala.; Fla.) | 1,612,250 | 24.3 |
| Permian Basin (Tex. Dists. 7-C, 8; S.E. New Mex. | 1,308,300 | 19.8 |
| California | 1,005,600 | 15.2 |
| Rky. Mts. (Colo., Utah, N.W. New Mex., W. Neb., Wyo., Mont., N. Dak.) | 430,700 | 6.5 |
| Middle West (Ill., Ind., Ky., W. & Cent. Ohio, Mich., Tenn.) | 269,050 | 4.1 |
| Appalachian (N.Y., Pa., Va., W. Va., E. Ohio) | 52,650 | 0.8 |
| Total United States | 6,620,700 | 100.0 |

**Crude Oil Production in West Texas and Southeast New Mexico, by Years**

Sources: Texas, 1921-1938, private sources; 1939-April, 1953, Texas Railroad Commission; May-Aug., 1953, A.P.I.; Sept., 1953, estimated by WORLD OIL . . . New Mexico, 1924-1946, private sources; 1947-1948, New Mexico Oil Conservation Commission; 1949-June, 1953, U. S. Bureau of Mines; July-Aug., 1953, A.P.I.; Sept., 1953, estimated by WORLD OIL.

(BARRELS)

| YEAR | DIST. 7-C, TEXAS | | DIST. 8, TEXAS | | TOTAL WEST TEXAS | | S. E. NEW MEXICO | | TOTAL PERMIAN BASIN | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | Daily | Total | Daily | Total | Daily | Total | Daily | Total | Daily |
| 1921 | ..... | ..... | * | * | * | * | ..... | ..... | * | * |
| 1922 | ..... | ..... | 34,010 | 93 | 34,010 | 93 | ..... | ..... | 34,010 | 93 |
| 1923 | 18,425 | 51 | 166,145 | 455 | 184,570 | 506 | ..... | ..... | 184,570 | 506 |
| 1924 | 1,078,790 | 2,947 | 461,105 | 1,260 | 1,539,895 | 4,207 | 40,000 | 109 | 1,579,895 | 4,316 |
| 1925 | 8,984,865 | 24,616 | 798,895 | 2,189 | 9,783,760 | 26,805 | 797,859 | 2,186 | 10,581,619 | 28,991 |
| 1926 | 13,477,388 | 36,924 | 1,847,856 | 5,063 | 15,325,244 | 41,987 | 1,097,373 | 3,006 | 16,422,617 | 44,993 |
| 1927 | 17,173,218 | 47,050 | 35,273,808 | 96,640 | 52,447,026 | 143,690 | 632,624 | 1,733 | 53,079,650 | 145,423 |
| 1928 | 12,548,740 | 34,286 | 106,867,081 | 291,987 | 119,415,821 | 326,273 | 709,643 | 1,939 | 120,125,464 | 328,212 |
| 1929 | 10,923,491 | 29,927 | 122,355,067 | 335,220 | 133,278,558 | 365,147 | 1,351,666 | 3,703 | 134,630,224 | 368,850 |
| 1930 | 10,825,044 | 29,658 | 97,357,620 | 266,733 | 108,182,664 | 296,391 | 9,924,331 | 27,190 | 118,106,995 | 323,581 |
| 1931 | 12,173,798 | 33,353 | 65,405,130 | 179,192 | 77,578,928 | 212,545 | 14,750,831 | 40,413 | 92,329,759 | 252,958 |
| 1932 | 10,810,858 | 29,538 | 52,274,804 | 142,827 | 63,085,662 | 172,365 | 11,911,538 | 32,545 | 74,997,200 | 204,910 |
| 1933 | 8,563,843 | 23,463 | 45,602,515 | 124,938 | 54,166,358 | 148,401 | 13,630,263 | 37,343 | 67,796,621 | 185,744 |
| 1934 | 6,782,768 | 18,583 | 41,669,772 | 114,164 | 48,452,540 | 132,747 | 16,440,434 | 45,042 | 64,822,974 | 177,789 |
| 1935 | 6,385,155 | 17,494 | 47,625,706 | 130,481 | 54,010,861 | 147,975 | 19,843,843 | 54,367 | 73,854,704 | 202,342 |
| 1936 | 6,831,500 | 18,665 | 53,743,224 | 146,840 | 60,574,724 | 165,505 | 26,422,595 | 72,193 | 86,997,319 | 237,698 |
| 1937 | 8,374,000 | 22,942 | 66,346,000 | 181,770 | 74,720,000 | 204,712 | 37,968,000 | 104,022 | 112,688,000 | 308,734 |
| 1938 | 8,728,425 | 23,914 | 62,677,493 | 171,719 | 71,405,918 | 195,633 | 35,175,892 | 96,372 | 106,581,810 | 292,500 |
| 1939 | 7,593,250 | 20,803 | 70,516,417 | 193,196 | 78,109,667 | 213,999 | 36,971,183 | 101,291 | 115,080,850 | 315,290 |
| 1940 | 6,837,083 | 18,680 | 76,889,195 | 210,080 | 83,726,278 | 228,760 | 38,574,827 | 105,396 | 122,301,105 | 334,156 |
| 1941 | 6,465,337 | 17,713 | 85,989,625 | 235,588 | 92,454,962 | 253,301 | 39,263,953 | 107,572 | 131,718,915 | 360,873 |
| 1942 | 6,173,779 | 16,914 | 75,012,443 | 205,514 | 81,186,222 | 222,428 | 31,568,860 | 86,490 | 112,755,082 | 308,918 |
| 1943 | 6,521,526 | 17,867 | 91,574,233 | 250,888 | 98,095,759 | 268,755 | 38,487,893 | 105,446 | 136,583,652 | 374,201 |
| 1944 | 7,228,370 | 19,750 | 152,874,320 | 417,689 | 160,102,690 | 437,439 | 39,068,737 | 106,745 | 199,171,427 | 544,184 |
| 1945 | 8,394,014 | 22,997 | 167,012,036 | 457,567 | 175,406,050 | 480,564 | 36,857,998 | 100,981 | 212,264,048 | 581,545 |
| 1946 | 10,075,235 | 27,603 | 180,813,239 | 495,379 | 190,888,474 | 522,982 | 35,282,263 | 96,664 | 226,170,737 | 619,646 |
| 1947 | 13,906,004 | 38,099 | 206,514,967 | 565,794 | 220,420,971 | 603,893 | 40,521,243 | 111,017 | 260,942,214 | 714,910 |
| 1948 | 16,668,257 | 45,542 | 259,453,586 | 708,889 | 276,121,843 | 754,431 | 47,235,804 | 129,060 | 323,357,647 | 883,491 |
| 1949 | 16,807,896 | 46,049 | 210,767,351 | 577,445 | 227,575,247 | 623,494 | 47,310,000 | 129,616 | 274,885,247 | 753,110 |
| 1950 | 20,917,096 | 57,307 | 262,985,846 | 720,509 | 283,902,942 | 777,816 | 47,036,000 | 128,866 | 330,938,942 | 906,682 |
| 1951 | 35,988,102 | 98,597 | 341,617,737 | 935,939 | 377,605,839 | 1,034,536 | 52,392,000 | 143,540 | 429,997,839 | 1,178,076 |
| 1952 | 53,302,150 | 145,634 | 341,605,046 | 933,347 | 394,907,196 | 1,078,981 | 58,778,000 | 160,596 | 453,685,196 | 1,239,577 |
| Total Thru 1952 | 360,558,407 | ..... | 3,324,132,272 | ..... | 3,684,690,679 | ..... | 780,045,653 | ..... | 4,464,736,332 | ..... |
| 1953: 1st 9 Months | 45,105,496 | 165,222 | 251,450,221 | 921,063 | 296,555,717 | 1,086,285 | 51,477,370 | 188,562 | 348,033,087 | 1,274,847 |
| Total Thru Aug., 1953 | 405,663,903 | ..... | 3,575,582,493 | ..... | 3,981,246,396 | ..... | 831,523,023 | ..... | 4,812,769,419 | ..... |

* Small production, but no record of amount.

# West Texas Discoveries Reach Peak

**• Some 210 finds recorded in the area during past 12 months.**

**• Here's (1) what they were (2) who made them, (3) where located and (4) significance.**

**By JAMES C. WATSON,** Oil Editor, *Reporter-Telegram,* Midland, Texas

NEW DISCOVERIES of oil and gas in the West Texas region of the vast Permian Basin continue at a record-breaking pace. In the 12-month period from Sept. 1, 1952 to Aug. 31, 1953, some 210 new discoveries were made. While some of these were of little significance, many were of major importance that stimulated stepped-up exploration activity to find similar fields.

Most of the wildcatting in West Texas during the past year has been in attempts to find production in pre-Permian formations . . . that is, in the Pennsylvanian, Devonian and Ellenburger. Deeper drilling has paid off, particularly along the eastern flank of the Central Basin Platform and on the western side of the Midland Basin. Discoveries made in these contiguous areas have caused more attention to be given possibilities of similar production on the western flank of the Central Basin Platform and on the eastern side of the Delaware Basin . . . the western side of the over-all Permian Basin.

Exploration in those regions so far has not developed any considerable number of commercial discoveries, however, it has shown that there is oil and gas in the lower Permian and Devonian zones. Some shows have been logged in a few Ellenburger prospects.

Of the 210 discoveries in West Texas in the past 12 months, 45 of them were in formations below the Pennsylvanian, that is, from the Devonian, Ellenburger and Cambrian. The Pennsylvanian produced petroleum in commercial quantities in 86 of the discoveries and 78 new strikes were reported from Permian formations. Some of the Permian discoveries have been from the Wolfcamp, and a few geologists place part of the Wolfcamp strikes in the upper Pennsylvanian. However, a majority of West Texas geologists still consider the Wolf camp to be in the basal Permian. It may come to the point that some Wolfcamp producers in West Texas ultimately will be classed as Permo-Pennsylvanian. This is already the situation in southeast New Mexico where it is nearly impossible in many cases to determine where the Permian stops and the Pennsylvanian begins.

Although not shown on the accompanying map and not included in Texas Railroad Commission District 8 and 7-C, Nolan and Coke Counties on the very eastern shelf of the Permian Basin have accounted for significant commercial production from the Cambrian. Humble Oil & Refining Company completed the first discovery from the Wilberns dolomite in its No. 3 Butner in eastern Coke County. This particular formation was previously considered by most operators as dry, since up to this important find, the Wilberns has not been productive throughout the Basin. American Trading & Production Corporation found flowing production from the Hickory sand in the Cambrian in its No. 1 Little of the White Flat (multipay) area in northeast Nolan County. An offset, American Trading & Production No. 2 Little discovered flowing production in the Wilberns dolomite of the Cambrian. Both wellls were dually completed with the Strawn zone which is productive at White Flat.

The White Flat field, opened about the middle of 1952, now has seven separate producing formations. There are the Wilberns dolomite and the Hickory sand, both in the Cambrian, the Ellenburger, the Bend congomerate, the Odom lime, the Strawn sand and the Caddo lime. The last four formations are members of the Pennsylvanian. All pay sections in the White Flat field complete for high potentials.

Andrews County, with 12 wildcat discoveries completed from pre-Permian formations during the past 12 months, has been in the spotlight during this period. Among the important discoveries in this highly-active county have been: (1) Anderson-Prichard Oil Corporation and J. C. Barnes No. 1-E University of Texas, opener of the Prichard (Devonian) field; (2) The Texas Company No. 1-AB State, which brought in the Block 5 (Devonian) field; (3) Humble Oil & Refining Company's No. 1-24 Fasken, which opened the Midland Farms (Ellenburger) field; Phillips Petroleum Company's No. 2-CC Texas University, discovery of the Andrews, Northeast (Ellenburger) field; and Shell Oil Company's No. 1-A-1 University, which brought in the Midland Farms, Northeast (Ellenburger) field. Magnolia discovered the C Ranch (Devonian) field in Andrews County with its Magnolia Petroleum Company-Texas Eastern Production Corporation, et al, No. 1-GA Fasken. Continental Oil Company's No. 1 McCollum & Weibusch, opened up the Wemac field, and The Texas Company's No. 1-H Parker discovered the Andrews (Wolf-Camp) field. Stanolind and Anderson's-Prichard's No. 5-F Deep Fasken, found commercial production to bring in the Midland Farms (Fusselman) field.

In eastern Ector County, Texas Gulf Producing Company's No. 1 V. E. Headlee was completed as a discovery of the Headlee (Ellenburger) field and the same company's No. 4 Headlee was finished as the opener for Devonian production in the same area.

Plymouth Oil Company's No. 1-A H. S. Foster discovery the Hallanan (Strawn) field in west Midland County, and Magnolia Petroleum Company's No. 1 Ida Mae Oldham found small production from the

Strawn and was completed as a discovery.

Gulf Oil Corporation and Stanolind Oil and Gas Company opened the Gulfstano (Ellenburger) field in Crane County with their No. 1-EH Gulf-Stanolind-State, and Gulf brought in the Lea (Ellenburger) field with its No. 1 P. J. Lea, et al.

In Hockley County, Stanolind discovered the Ropes, West (Pennsylvanian) field with its No. 1 B. E. Thompson, which produced from the Cisco, and Zephyr Drilling Corporation and Sunray Oil Corporation found Clear Fork-Permian production to open the Clauene (Clear Fork) field in their No. 1 C. T. Pace.

Hassie Hunt Trust, Dan Auld and associates No. 1 J. A. Timmons, in Northwest Lynn County opened the Tahoka (Pennsylvanian) field.

Sinclair Oil & Gas Company No. 1-101 University-Schleicher found the University, 101 (Ellenburger) field in Northwest Schleicher County; C. L. Norsworthy, Jr., No. 1 Virgil J. Powell opened the Tillery (Canyon) field in Schleicher; Humble Oil & Refining Company No. 1 Mrs. Olivia Spencer opened an unnamed gas-condensate field in Schleicher.

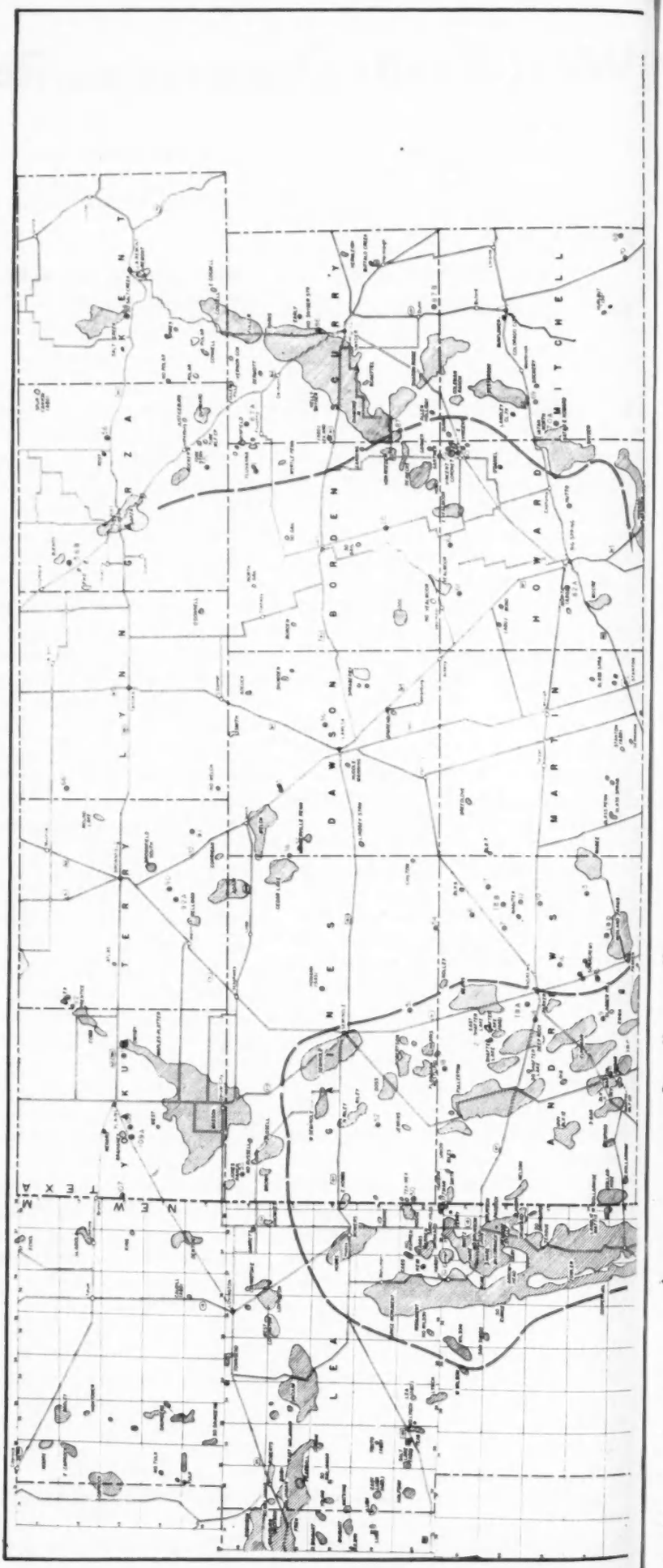
Fullerton Oil Company et al No. 1 Zorns opened the State (Cisco) field in Terry County and Amerada Petroleum Corporation No. 1 L. R. Weems discovered the Bronco (Devonian) field in Yoakum County. That field has now stretched across into Lea County, New Mexico.

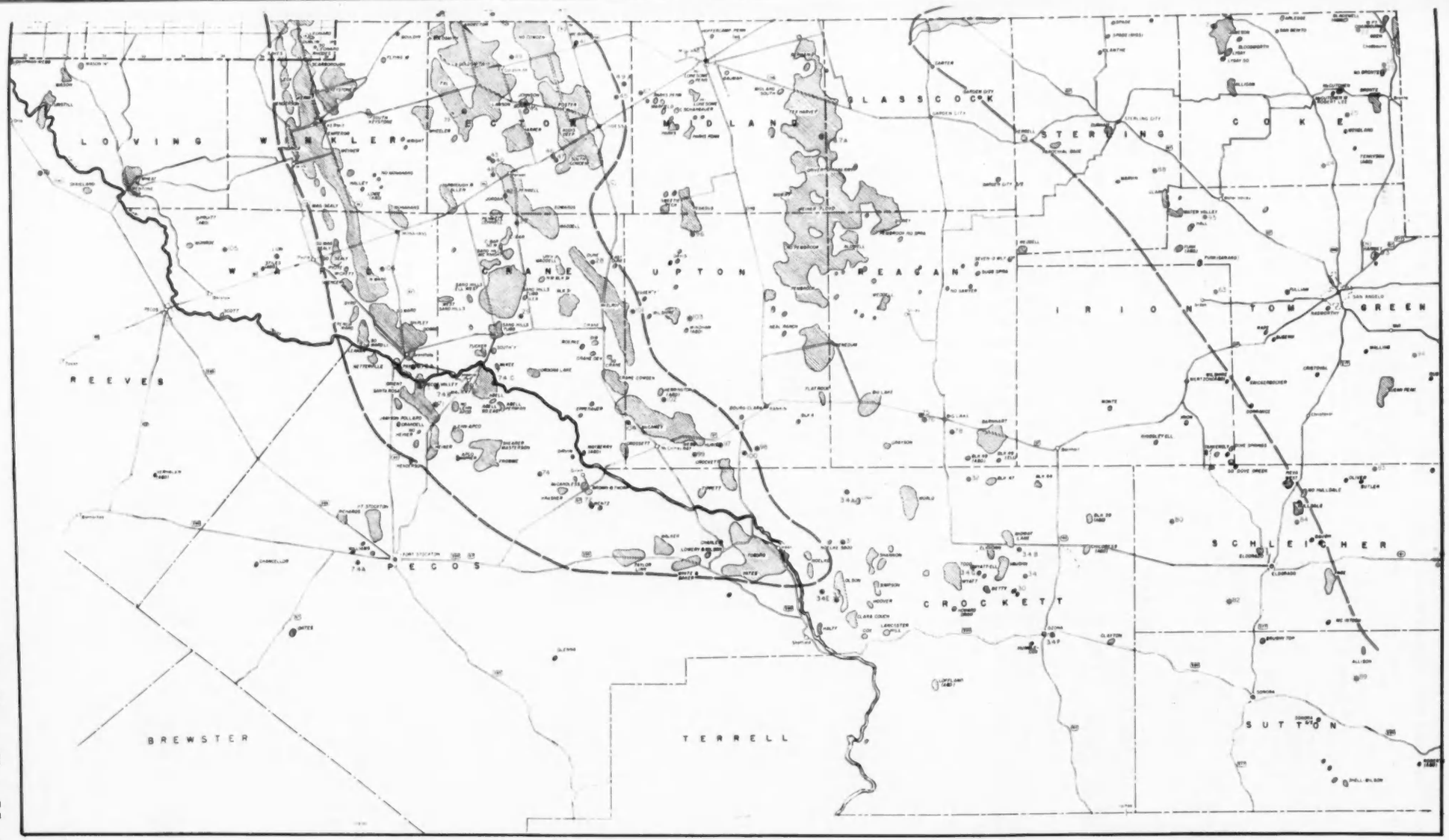
Gulf No. 276 Hutchings opened the H-S-A (lower O'Brien) field in Ward County.

Luce and Ice No. 1-A Bricton discovered gas and condensate in Ward County to open the Payton (Devonian) field. This discovery has touched off another deep play similar to that of a year ago along the west flank of the Midland Basin.

Ocenic Oil Company and Green and McSpadden No. 1 Winans opened a new Pennsylvanian field in North Howard County late in August and during the same month Seaboard Oil Company and associates No. 1 Pettaway was completed as a prolific reef lime discovery in Southeast Dawson County after logging more than 248 feet of Pennsylvanian reef lime pay above the water table. Field names have not yet been given to either of the last two discoveries. —**The End**

**West Texas Discovery Oil Map**






**Blue shows new discoveries made during past 12 months (Sept. 1, 1952, to Aug. 31, 1953). See table on Pages 134, 136 and 138 for summary of oil and gas discoveries and guide to map.**

*Map courtesy of Midland Map Company, Midland, Texas*

## Summary of Oil and Gas Discoveries in West Texas, Sept. 1, 1952-Aug. 31, 1953

| Map No. | Operator | Well Name | Date Completed | Total Depth | Avg. Production Depth | Initial Daily Production | Gravity API | Formation Name | Field Name |
|---|---|---|---|---|---|---|---|---|---|
| | **ANDREWS COUNTY** | | | | | | | | |
| 1 | Superior | 11-C-2 University | 11-26-52 | 8548 | 7950 | F283BO | 43.6 | Wolfcamp | Block 11* |
| 2 | Tobe Foster | 1 University | 10- 4-52 | 4532 | 4504 | P35BO | 31.2 | San Andres | Shafter Lake, North |
| 3 | Anderson-Prichard | 1-24 Fasken | 9-26-52 | 12795 | 12672 | F675BO | 49.8 | Ellenburger | Midland Farms* |
| 4 | Group Oil Company | 1 University | 11-17-52 | 8250 | 8160 | F299BO | 41.7 | Devonian | Block 11, South |
| 5 | Magnolia | 1-EA Fasken Block | 11-29-52 | 9143 | 8430 | F366BO 11BW | 39 | Wolfcamp | Inez |
| 6 | Texaco | 1-AB State | 11-11-52 | 12667 | 12592 | P133BO | 41.6 | Devonian | Block 5 |
| 7 | Phillips | 2-CC University | 5- 3-53 | 13853 | 13828 | F1259BO | 41.1 | Ellenburger | Andrews, Northeast* |
| 8 | Phillips | 1-JJ University | 12- 5-52 | 12340 | 4620 | P108BO | 31.2 | San Andres | Block 10 |
| 9 | Gulf | 1-K-AR State | 5-24-53 | 5550 | 5490 | F129BO | 29.6 | McKnight | Triple N* |
| 10 | Magnolia | 1-CA Fasken | 1- 5-53 | 12883 | 12738 | F200BO | 56.9 | Devonian | C-Ranch |
| 11 | Shell | 1-A-1 University | 1- 6-53 | 12635 | 12540 | F471BO | 51.5 | Ellenburger | Midland Farms, Northeast |
| 12 | Humble | 1-Q University | 2-17-53 | 12533 | 12509 | F418BO | 44 | Devonian | Hutex |
| 13 | Magnolia | 1-BA Fasken | 3- 4-53 | 13560 | 12818 | F114BO | 49.9 | Fusselman | Lowe |
| 14 | Lubbock Machine | 1 Logan-Parker | 4-21-53 | 4659 | 4482 | P164BO | 38.1 | San Andres | Shafter Lake* |
| 15 | Humble | 2-O University | 7-16-53 | 11107 | 11035 | F203BO | 48 | Devonian | Andrews, South (Devonian) |
| 16 | Continental | 1 McCollum & Wiebusch | 5-10-53 | 9175 | 8708 | F1560BO | 42.6 | Wolfcamp | Wemac |
| 17 | Stanolind & Anderson-Prichard | 5-F Fasken | 6- 9-53 | 13180 | 11886 | F333BO | 48 | Fusselman | Midland Farms* |
| 18 | Herman Brown | 1 Dora Mann | 5-30-53 | 6517 | 6377 | F125BO | 34.4 | Clear Fork | |
| 18a | Texaco | 1-H Parker | 7- 9-53 | 8823 | 8496 | F1002BO | 37.5 | Wolfcamp | Andrews (Wolfcamp) |
| 18b | Anderson-Prichard, J. C. Barnes | 1-E University | 6-18-53 | 13700 | 12322 | F3353BO | 44.4 | Devonian | Prichard |
| 18c | Husky | 1 Cowden | 8-24-53 | 5416 | 5348 | F143BO | 38.45 | Glorietta | Emma* |
| 18d | Humble | 15 Parker | 8- 7-53 | 9105 | 5590 | P14BO P14BW | 37.79 | Clear Fork | Martin* |
| 18e | Stanolind | 1-AE Midland Farms | 8- 6-53 | 12955 | 4795 | P158BO | 23 | Grayburg | Midland Farms, North (Grayburg) |
| | **BORDEN COUNTY** | | | | | | | | |
| 19 | Cosden | 1-532 Belew | 1- 2-53 | 8368 | 8360 | F308BO | 36.4 | Ellenburger | Fluvanna, West |
| 20 | Rowan Drilling Co. | 1 Long | 2-21-53 | 8606 | 8502 | F80BO | 44 | Mississippian | Red Fork |
| | **COKE COUNTY** | | | | | | | | |
| 21 | Southwest Natural | 1 Phelan | 9-18-52 | 6411 | 5886 | F326BO | 46 | Up'r Strawn | Jameson, West |
| 22 | Marlowe | 1 Copeland | 10- 4-52 | 6466 | 6420 | F95BO 84BW | 48.5 | Ellenburger | Charles Copeland |
| 23 | Humble | 3 Butner | 2-23-53 | 5606 | 5541 | F382BO | 52 | Wilberns | Bronte North, (5500)* |
| 24 | Humble | 1. H. H. Weaver | 4- 7-53 | 6989 | 5336 | P104BO | 42 | Palo Pinto | Weaver |
| 23 | F. Kirk Johnson | 1 Wendland | 5-13-53 | 3695 | 3691 | F95BO | 40 | Cisco | Wendkirk (Cisco) |
| 26 | Lion Oil | 1 Mary | 3- 6-53 | 5677 | 5031 | F167BO | 50.6 | Goens | Bronte* |
| 26a | Lion | 1 Edward | 2-25-53 | 5800 | 5760 | F286BO | 49.2 | Ellenburger | Bronte North, (Ellenburger) |
| 26b | Lion | 5 Mary | 4-19-53 | 5615 | 4184 | F160BO | 46 | Canyon sd. | Bronte North* |
| | **CONCHO COUNTY** | | | | | | | | |
| .. | Amerada | 1 Waide | 6- 3-53 | 2862 | 2214 | F76BO | 41 | Pennsyl'ian | Millersveiw-Waide |
| .. | Amerada | 1 Whitfield | 5- 8-53 | 3080 | 1660 | P7BO P77BW | 43.8 | Pennsyl'ian | Millersview |
| .. | Progress Petroleum | 2 Speck | 7- 1-53 | 3686 | 3656 | P50BO | 37.2 | Caddo | Speck Ranch |
| | **CRANE COUNTY** | | | | | | | | |
| 27 | T. M. Evans | 1 Jordan-Ingram | 6-21-53 | 9068 | 7828 | F242BO | 41 | Penn Detrital | Jordan (Penn Detrital) |
| 28 | Gulf and Stano'ind | 1-EH State | 6-23-53 | 12012 | 11890 | F356BO | 48.2 | Ellenburger | Gulfstano (Ellenburger) |
| 29 | Gulf | 1 Lea, et al | 6-29-53 | 8448 | 8165 | F1254BO | 41.2 | Ellenburger | Lea (Ellenburger) |
| | **CROCKETT COUNTY** | | | | | | | | |
| 30 | Barron Kidd | 1-B Pure-Bean | 6-21-52 | 1143 | 1136 | P10BO | 31 | Queen | Pure-Bean |
| 31 | Houston Oil, et al | 1 Shannon Estate | 2-27-53 | 8190 | 6608 | P82BO | 35.4 | Pennsy'ian | |
| 32 | Texas Gulf | 1-J University | 3-17-53 | 2500 | 2236 | F7BO | 30.4 | San Andres | Farmer |
| 33 | Cities Service, et al | 1-B Hobbs | 1-11-53 | 5984 | 5912 | F945BO F12500-MCF | 46.1 | Cisco | |
| 34 | Harry J. Russell | 1 Martin, et al | 6-17-53 | 1385 | 1149 | P8BO | 31 | Grayburg | |
| 34a | Continental | 2-C Harris | 7-22-53 | 8247 | 8171 | F363BO | 47 | Strawn | |
| 34b | Tubb-Gann Drlg. Co. | 1 Chambers CSL | 4-26-53 | 1292 | 1279 | P67BO | 34 | Queen | Midway Lane (1300) |
| 34c | Sandor Petroleum | 1 Bouscaren Heirs | 2- 8-53 | 4866 | 4430 | F242BO | 51 | Pennsy'ian | Noelke (4400) |
| 34d | Sun | 1-X Mitchell | 5-20-53 | 14407 | 13750 | F3273-MCF | gas | Ellenburger | |
| 34e | Ledge Petroleum | 1-A Bouscaren Heirs | 7- 1-53 | 4810 | 3565 | F60BO | 41.6 | Clear Fork | Noelke (Clear Fork)* |
| 34f | Shell | 1 Friend | 6-15-53 | 8490 | 8340 | F756-MCF F64BD | 72.8 | Ellenburger | |
| 34g | Humble | 1 Shannon Est. | 1- 1-53 | 7575 | 6996 | F1200-MCFPD | Gas | Ellenburger | Wyatt (Ellenburger) |
| | **CULBERSON COUNTY** | | | | | | | | |
| .. | Grisham-Hunter and M. A. Grisham | 1-10 Grisham Fee | 9 -8-52 | 9054 | 9030 | F9900-MCF | Gas | Devonian | |
| .. | Ralph Love | 1-A State | 1-11-53 | 3024 | 2670 | P26BD | 22.1 | Delaware | Marsh |
| | **DAWSON COUNTY** | | | | | | | | |
| 35 | Cities Production | 1-B Leverett | 12- 9-52 | 11900 | 7690 | F154BO | 38.5 | Spraberry | Welch, North |
| 36 | Seaboard | 1 King | 2-14-53 | 8960 | 3875 | P22BO | 33.7 | San Andres | Arvanna |
| 37 | Ponder Oils | 1 Lindsey | 2-14-53 | 8589 | 8566 | P115BO | 42 | Canyon Reef | Mungerville, Northwest |
| 38 | McClure, Hopkins, Logan | 1 Fowler | 6-10-53 | 8575 | 4940 | P69BO P31BW | 33 | San Andres | Clear Lake |
| | **DICKENS COUNTY** | | | | | | | | |
| .. | Pacific Western | 1 Smith | 3- 5-53 | 4535 | 4414 | P113BO P15BW | 36 | Tannehill | Girard |
| | **ECTOR COUNTY** | | | | | | | | |
| 39 | Phillips | 5-D TXL | 5-10-53 | 9700 | 9510 | F216BO | 44.4 | Waddell | TXL (Waddell)* |
| 40 | British American | 1 Edison | 6-19-53 | 8318 | 7930 | P69BO | 40.6 | Pennsy'ian | Penwell* |
| 41 | Herman Brown | 1 David Fasken | 9-11-52 | 10314 | 8650 | F768BO | 45 | Upper Wolfcamp | McBoring |
| 42 | Gulf | 34-B Connell | 1-31-53 | 5037 | 4960 | F312BO F27BW | 39.1 | Clear Fork | Penwell* |
| 43 | Wrather | 1 Hall, et al | 10-30-52 | 11099 | 9830 | F173BO | 42.6 | Fusselman | Wrather-Donnelly* |
| 44 | Eastland Oil | 28 Johnson | 11- 9-52 | 5908 | 5599 | P55BO P28BW | 30 | Tubb | Donnelly |
| 45 | Texas Gulf | 1 Headlee | 1-11-53 | 13313 | 13106 | F643BO | 51.3 | Ellenburger | Headlee |
| 46 | Cities Production & Union | 1-C Cross | 6-14-53 | 12015 | 8230 | P161BO P14BW | 33 | Wolfcamp | Addis* |
| 47 | Cities Production | 1-E Cross | 3-27-53 | 4340 | 4264 | F321BO | 34.4 | San Andres | Addis* |
| 48 | Phillips | 2-A Millard | 5-30-53 | 8961 | 6670 | F709BO F125BW | 41.2 | Wichita-Albany | Penwell* |
| 49 | Forest | 1-L TXL | 1-30-53 | 11902 | 8621 | F261BO | 40.2 | Pennsy'ian | Goldsmith, East |
| 49a | Texas Gulf | 4 Headlee | 8-15-53 | 11888 | 11756 | F390BO | 41.1 | Devonian | Headlee* |
| | **FISHER COUNTY** | | | | | | | | |
| .. | B. M. Hester & Son | 1 Dooley | 7-23-53 | 6812 | 6786 | F360BO | 41.5 | Caddo | |
| .. | Moore & Moore, G. A. Poe and G. Poe | 1 Hawkins | 1-29-53 | 5003 | 4526 | F78BO | 40 | Caynon | |

* Denotes new pay in existing field.

## What's in the name?

# Cat Crawler

In the oilfields, "a tractor for use on rough ground, which travels upon two endless metal belts" is commonly called a "cat crawler". This term stems from "caterpillar"—the creature whose method of locomotion it imitates.

And in the Permian Basin the name Brown Well Service means 'round the clock' facilities for complete machine shop work including:

Reworking of Kellys, Subs and Drill Collars; Complete Thread Milling Service and scientific heat treating.

Brown Well Service means a complete cutting and fishing tool service, and a full line of production and cementing tools.

Brown Well Service has one of the largest and best equipped machine shops in the entire Permian Basin — No two ways about it — 'Round the Clock' they do it up BROWN at BWS.

*Permian Basin representative for Brown Oil Tools, Inc.*

# Brown well service

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## Summary of Oil and Gas Discoveries in West Texas, Sept. 1, 1952-Aug. 31, 1953—(Continued)

| Map No. | Operator | Well Name | Date Completed | Total Depth | Avg. Production Depth | Initial Daily Production | Gravity API | Formation Name | Field Name |
|---|---|---|---|---|---|---|---|---|---|
| .. | Heard & Heyser and Norando | 2 Rushing | 7- 2-53 | 5277 | 5258 | F145BO | 42 | Canyon | |
| .. | Sun | 1 McDonald Bros. | 3-15-53 | 5753 | 5672 | P50BO | 36 | Canyon | |
| .. | Lebus Brothers | 1 J. B. Terrell | 8- 3-53 | 5066 | 3405 | P85BO | 40 | Flippen | |
| .. | Cherry Brothers | 1 Bailey | 6- 1-53 | 5265 | 5230 | F2016BO | 39 | Strawn | |
| .. | West Central Drlg. | 1 Ulmer | 6-10-53 | ..... | 4527 | F241BO | 40.5 | Canyon | |
| .. | West Central Drlg. | 1 Canfill | 6-10-53 | ..... | 4997 | P41BO | 38.2 | Canyon | |
| | **GAINES COUNTY** | | | | | | | | |
| 50 | Texas Crude | 1-4 Forest-Dunbar | 12-29-52 | 4375 | 4335 | F4000-MCF | Gas | San Andres | Tex.-Mex. |
| 51 | Texas Company | 1. R. A. Cox | 9-16-52 | 12776 | 9250 | F51BO F103BW | 34 | Wolfcamp | Botenfield |
| 52 | Humble | 1 Riley, et al | 11-30-52 | 10000 | 8990 | F611BO | 41.8 | Canyon | Jenkins, North* |
| 53 | Forest | 1-A Jones | 4-20-53 | 11301 | 11258 | P221BO | 41.9 | Devonian | Jones' Ranch, South |
| 54 | Anderson-Prichard & Forest | 2-A Parmer CSL | 3-10-53 | 12805 | 5150 | P5BO P11BW | 26.4 | San Andres | Florey* |
| | **GARZA COUNTY** | | | | | | | | |
| 55 | R. S. Anderson | 1-39 Miller | 10- 1-52 | 3074 | 2429 | P26BO P52BW | 37 | San Andres | Rocker A, South |
| 56 | Duncan Drilling | 1 Davis | 11-15-52 | 2825 | 2741 | P22BO | 39 | Clear Fork | Post* |
| 56a | Threeway | 1 Durrett | 8-31-53 | 3386 | 3317 | P59BO P20BO | 36 | San Andres | |
| 56b | Thomas, et al. | 1 Honolulu-Sims | 8-15-53 | 3530 | 3481 | P144BO P72BO | 36 | San Andres | PHD* |
| | **HOCKLEY COUNTY** | | | | | | | | |
| 57 | Stanolind | 1 Thompson | 2-14-53 | 9908 | 9875 | F298BO | 42 | Pennsy'ian | Ropes, West |
| 58 | Zephyr & Sunray | 1 Pace | 6-17-53 | 7572 | 6373 | P93BO | 29.4 | Clear Fork | Clawene |
| | **HOWARD COUNTY** | | | | | | | | |
| 59 | Standard of Texas | 1-1 Jones | 9-11-52 | 2936 | 2890 | F243BO | 25.9 | San Andres | Vincent* |
| 60 | King Oil | 1 Magnolia-Winters | 1- 5-53 | 7550 | 7450 | F168BO | 46 | Canyon Reef | Vincent* |
| 61 | Pan American | 1 Pauline Hamlin | 11-21-52 | 8324 | 8160 | F312BO | 47 | Canyon Reef | Luther, North |
| 62 | Stanolind | 1 Minnie Smith | 4-27-53 | 7851 | 7773 | P28BO | 40 | Canyon Reef | Vealmoor, Centra |
| 62a | Oceanic, Green and McSpadden | 1 Winans | 8-17-53 | 8195 | 8138 | F1763BO | 42.3 | Pennsy'ian | |
| | **IRION COUNTY** | | | | | | | | |
| 63 | Jones & Lyons | 1 Fields | 9-15-52 | 772 | 446 | P32BO | 27 | San Andres | |
| | **KENT COUNTY** | | | | | | | | |
| 64 | General American | 1 Atkins Unit | 12-15-52 | 6659 | 6622 | P115BO | 40.1 | Canyon Reef | Salt Creek, South |
| | **KING COUNTY** | | | | | | | | |
| .. | Ard Drlg. Co. | 1 Masterson | 6- 5-53 | 4135 | 4072 | P139BO | 34.5 | Bunger | Tom B |
| .. | Shell | 1 S. B. Burnett | 1-21-53 | 5607 | 5520 | F143BO | 36.2 | Pennsy'ian | Tap |
| | **LOVING COUNTY** | | | | | | | | |
| 65 | J. H. Floyd | 1 W. D. Johnson | 2- 5-53 | 3107 | 3106 | F58BO | 42 | Delaware | Red Bluff |
| | **LYNN COUNTY** | | | | | | | | |
| 66 | Hassie Hunt, Dan Auld | 1 Timmons | 1-23-53 | 9909 | 9803 | F289BO | 47.1 | Pennsy'ian | Tahoka |
| | **McCULLOCH COUNTY** | | | | | | | | |
| .. | R. O. Williamson | 1 Willie Silet | 7-13-53 | 1681 | 1675 | F209BO | 38 | Strawn | |
| . | J. J. Rogers and L.B. Thomas | 2 Hoepgle | 4-28-53 | 1735 | 1729 | F500 MCF | Gas | Strawn | |
| | **MARTIN COUNTY** | | | | | | | | |
| .. | Plymouth | 1 Millhollon | 1-30-53 | 7889 | 7864 | P24BO | 39.1 | Spraberry | |
| | **MIDLAND COUNTY** | | | | | | | | |
| 67 | Plymouth | 1-A Foster | 10-17-52 | 11223 | 10570 | F299BO | 47 | Strawn | Hallanan |
| 67a | Magnolia | 1 Ida Mae Oldham | 8-18-53 | 10589 | 10239 | P126BO | 43.6 | Pennsy'ian | |
| | **MITCHELL COUNTY** | | | | | | | | |
| 68 | Sun | 1 McCabe | 3- 7-53 | 6866 | 5928 | F265BO | 45.2 | Pennsy'ian | Jameson, North |
| 69 | Humble | 1-B Lucy Coleman | 2-23-53 | 3145 | 3130 | F6BO | 26.2 | Clear Fork | Coleman Ranch, North |
| 70 | Robert L. Wood | 1 Dickson | 4-18-53 | 6400 | 6234 | F45BO | 44.3 | Strawn | Dixon |
| 70a | Humble | 1 Farmer | 8-10-53 | 2560 | 2555 | P17BO | 26.2 | Clear Fork | |
| | **NOLAN COUNTY** | | | | | | | | |
| .. | American Trading | 1 Little | 6-18-53 | 5698 | 5454 | F571BO | 46.5 | Hickory | White Flat* |
| .. | American Trading | 2 Little | 8- 9-53 | 5858 | 5506 | F1870BO | 46 | Wilberns | White Flat* |
| .. | Chicago Corp. | 1 C. E. Boyd | 8- 1-53 | 5940 | 5918 | F144BO | 46.5 | Ellenburger | Dora, North |
| .. | T. A. Kirk | 1 J. W. Lynch | 6-10-53 | 6120 | 6048 | F149BO | 44 | Caddo | |
| .. | Payne-Johnson, Byars | 1 Kegans | 1- 8-53 | 5625 | 5499 | F647BO | 48.7 | Bend | White Flat* |
| .. | Payne-Johnson, Byars | 1 McElmurray | 2- 4-53 | 5570 | 5056 | F135BO | 41.3 | Strawn | White Flat* |
| .. | Stanolind | 1-E TXL | 5-12-53 | 6534 | 4081 | P177BO | 40 | Cisco | |
| .. | J. D. Wrather | 1 J. E. Davis | 2-13-53 | 6615 | 6598 | F354BO | 48.5 | Ellenburger | Blackwell, North |
| .. | Jones & Stasney | 1 Cochran | 6- 9-53 | 6676 | 4015 | F265BO | 37 | Cisco | |
| | **PECOS COUNTY** | | | | | | | | |
| 71 | H. L. Hunt | 1 Eaton | 5-28-53 | 5710 | 5368 | F65 BO F3500 MCF | 56 | Devonian | |
| 72 | G. D. Putman & Co. | 1 Hart, et al | 2-14-53 | 4753 | 2415 | F264BO | 34.7 | Cleark Fork | Wentz |
| 73 | Sinclair | 1 Iowa Realty Trust | 5-17-53 | 8100 | 5682 | F452BO | 34.2 | Fusselman | Pecos Valley* |
| 74 | Brown & Thorp and La Gloria | 1-F Sullivan | 6-19-53 | 4224 | 4810 | P115BO P161BW | 39.6 | Ellenburger | Krasner* |
| 74a | Schemerhorn | 1 Montague | 8-17-53 | 3110 | 3065 | P104BO | 27 | Yates | |
| 74b | H. L. Hunt | 1 Jackson | 8-21-53 | 5751 | 5448 | F41BO | 37.9 | Devonian | |
| 74c | T. T. Elsworth | 1-B Simmons | 6-16-53 | 5920 | 5785 | F36BO | 43 | Ellenburger | |
| | **REAGAN COUNTY** | | | | | | | | |
| 75 | Texas Company | 1-AC State | 2- 5-53 | 9742 | 9410 | F288BO | 49.1 | Ellenburger | Big Lake, West |
| 76 | Texas Company | 1-AF State | 4-20-53 | 9752 | 9442 | F254BO F9700 MCF | 72.3 | Fusselman | Big Lake, West* |
| 77 | Phillip R. Jonsson | 1 Wolters, et al | 6- 4-53 | 2434 | 2342 | F18BO | 30 | Grayburg | |
| 78 | Phillips | 1-A Kenneth | 6-19-53 | 11043 | 6111 | F89BO F37BW | 39 | Spraberry | Spraberry Trend Area |
| | **REEVES COUNTY** | | | | | | | | |
| 79 | Buffalo | 1 Herman Lindley | 5-12-53 | 3562 | 3400 | P55BO | 34.1 | Delaware | Orla, South |
| | **RUNNELS COUNTY** | | | | | | | | |
| .. | Mar-Tex & Edward Lee | 1 Bryan | 9-30-52 | 4427 | 4421 | F247BO | 38.4 | Goens | Jean Burk |
| .. | Rowan | 1 C. H. Ashton | 9-28-52 | 4810 | 4525 | F122BO | 38.4 | Goens | Valley Creek |
| .. | Sojourner | 1 William Ashton | 9- 5-52 | 2390 | 2380 | P32BO P5BW | 46.0 | Serratt | |
| .. | Humphrey | 1 D. O. Lee | 9- 9-52 | 5115 | 5108 | F160BO | 40.1 | Caddo | Humphrey-Lea |
| .. | Humble | 3 G. W. Poe | 9-22-52 | 4513 | 2996 | F145BO | 43.8 | Canyon | Poe* |
| .. | E. K. & E. M. Burt-Edgar Davis | 1 J. H. Jones | 9-19-52 | 4217 | 3621 | F27500 MCF | Gas | Fry | Crews, South* |
| .. | G. W. Strake | 1 Pace | 11-17-52 | 5187 | 4458 | F230BO | 42.4 | Fry | Pace |
| .. | G. W. Strake | 1 Boothe | 9-19-52 | 4196 | 3865 | F18BO | 41.5 | Gardner | Boothe |

* Denotes new pay in existing field.

# PAGE*
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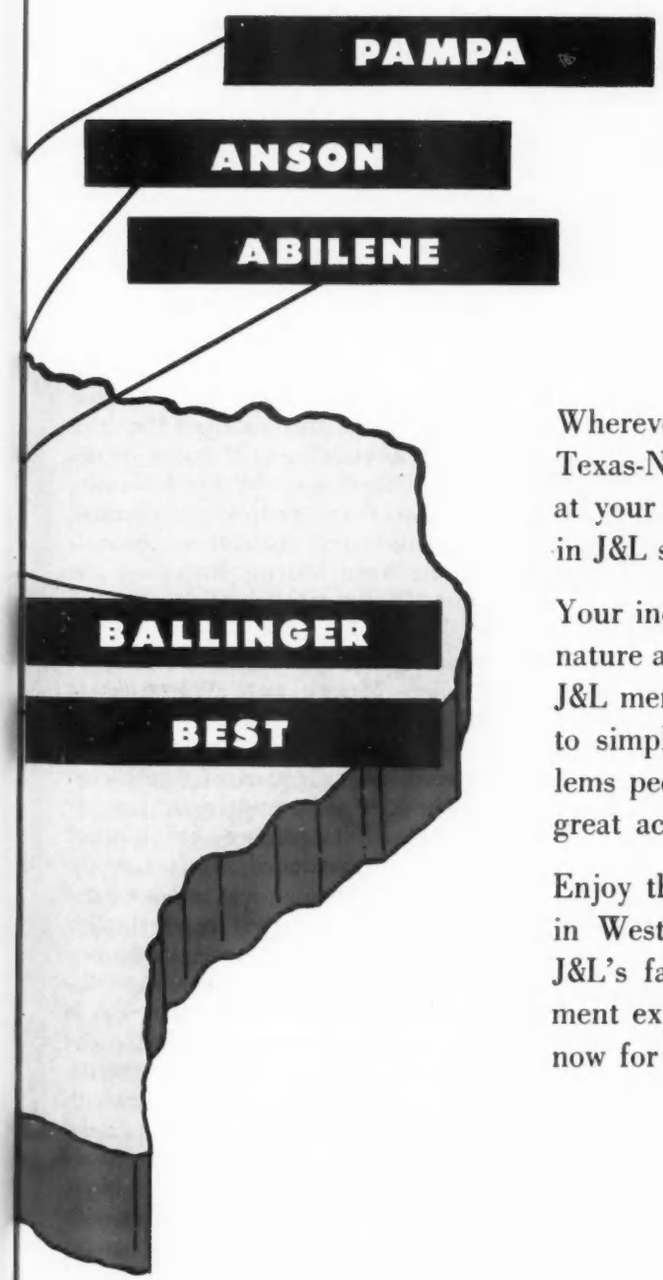
## Summary of Oil and Gas Discoveries in West Texas, Sept. 1, 1952-Aug. 31, 1953—(Continued)

| Map No. | Operator | Well Name | Date Completed | Total Depth | Avg. Production Depth | Initial Daily Production | Gravity API | Formation Name | Field Name |
|---|---|---|---|---|---|---|---|---|---|
| .. | Dew and Culbert & Son. | 1 Culp | 12-22-52 | 4256 | 4251 | F168BO | 41 | Morris | Helen-Kay |
| .. | G. B. Cree | 3 Stephens | 1- 5-53 | 4070 | 3782 | F384BO | 42.2 | Lower Fry | Cree-Stephens |
| .. | Mid-Continent | 27 Burnes | 1-13-53 | 4055 | 3708 | F115BO | 41.0 | Morris | Cree-Sykes* |
| .. | Moutray-Moore | 1 Curry | 1-17-53 | 4093 | 3961 | F400BO | 39.5 | L. Gardner | Hull-Dobbs, East |
| .. | Humble | 2 Poe | 2- 1-53 | 3052 | 2868 | P47BO | 44.1 | King | Poe* |
| .. | Inca Drilling Co. | 2-B Cole | 3-14-53 | 4214 | 3703 | F396BO | 39 | Morris | Sykes, West |
| .. | Burt-West Central | 1-B Spill | 3-12-53 | 2350 | 2343 | P87BO | 40.6 | King | Jim Burt* |
| .. | Mar-Tex | 1 Daniel | 4- 2-53 | 4323 | 4276 | F221BO | 42 | Cross Cut | Norton |
| .. | Murray, et al | 1 Lindemann | 4- 9-53 | 2537 | 2535 | F61BO | 43.1 | McMillan | ..... |
| .. | S. C. Herring | 1 Burford | 5-20-53 | 3994 | 3922 | F447BO | 40.0 | U. Gardner | Hull-Dobbs, East* |
| .. | Burt, et al | 1 Bendina Spill | 5-18-53 | 4095 | 4076 | F192BO | 42 | U. Gardner | Jim Burt, South |
| .. | Humphrey & Son | 6-A Tounget | 5-13-53 | 3857 | 3838 | F117BO | 41.2 | U. Gardner | Lindermann* |
| .. | Humble | 1 Barren | 4-25-53 | 3682 | 3668 | F114BO | 43.6 | Palo Pinto | Winters-Serratt* |
| .. | Burt, et al | 2. C. P. Spill | 6-10-53 | 2848 | 2637 | F289BO | 44 | McMillan | Jim Burt, South* |
| .. | B. F. Phillips, Jr. | 1 Hale | 6- 1-53 | 3905 | 3504 | F84BO | 42 | Morris | Lindemann* |
| .. | Hughes & Associates | 2-B Goetz | 7- 7-53 | 4120 | 3482 | P42BO | .... | Palo Pinto | Hughes-Davis |
| .. | S. C. Herring | 5 Bradshaw | ..... | 3730 | 3674 | F168BC | 40 | Morris | Hull-Dobbs* |
| .. | S. C. Herring | 1 Hale | 6-27-53 | 4044 | 3805 | F48BO | 40 | Gardner | ..... |
| .. | Melvin & Charles Lee | 1 Daniel | 4- 3-53 | 5084 | 4276 | F221BO | 42 | Crosscut | ..... |
| .. | Henson | 1 Johnson | 5-14-53 | 4310 | 3596 | F191BO | 40.4 | Morris | Enoch Johnson |
| .. | Weis, et al | 4 Brandon | 5-14-53 | ..... | 3468 | F288BO | 41.5 | Morris | Cree-Sykes, East* |
| .. | S. C. Herring | 1-A Aldridge | 5-26-53 | 4000 | 3852 | F120BO | 40 | U. Gardner | ..... |
| .. | Humphrey & Sons | 1 Thomas C. Hall | 7-26-53 | ..... | 3843 | F81BO | 38.8 | U. Gardner | ..... |
| .. | Inca Drlg. | 1 Poe | ..... | ..... | 3656 | F336BO | 39 | Morris | ..... |
| .. | Sojourner | 8- 6-53 | 3905 | 3615 | F195BO | 40 | Jennings | ..... | |
| .. | James K. Anderson | 1 Nunn Estate | 8-27-53 | 2410 | 2417 | F352BO | 47 | Serratt | ..... |
| | **SCHLEICHER COUNTY** | | | | | | | | |
| 80 | Sinclair | 1-101 University | 2- 6-53 | 8045 | 7910 | F342BO | 40.5 | Ellenburger | University 101 |
| 81 | Carter & Carter | 2 Webster | 3- 6-53 | 4825 | 4618 | F74BO F9200 MCF | Gas-dist | Ellenburger | Webster |
| 82 | Humble | 1 Spencer | 4-10-53 | 6978 | 6736 | F27BO F9500 MCF | 64.2 | Strawn | ..... |
| 83 | Berry, et al | 1 A. B. Thomerson | 3-31-53 | 5754 | 5288 | F135BO | 40 | Strawn | Toenail |
| 84 | Lone Star | 1 Joe Tisdale | 4-29-53 | 5880 | 5684 | F121BO | 42.9 | Strawn | Hulldale, South |
| 85 | C. L. Norsworthy, Jr. | 1 Virgil Powell | 6- 6-53 | 4800 | 3570 | F136BO | 36.2 | Canyon | Tillery |
| | **SCURRY COUNTY** | | | | | | | | |
| 86 | W. G. & R. A. Johnson | 1 Wade | 4-27-53 | 7526 | 7143 | F211BO | 37 | Strawn | North Snyder (Strawn A Zone)* |
| 87 | Humble | 4-B Sorrels | 1-14-52 | 6832 | 5310 | F360BO | 43.3 | Wolfcamp | Diamond M* |
| 87a | Zonne & Coronet | 1 Browning | 8-19-53 | 8307 | 2083 | F28BO | 32.8 | San Andres | ..... |
| 87b | Texas Company | 3 M. A. Fuller | 7-16-53 | 7576 | 2428 | F10BO | 29.2 | San Andres | Fullerville* |
| | **STERLING COUNTY** | | | | | | | | |
| 88 | P. L. Crandell | 1 T. H. Humble | 5- 1-53 | 1481 | 1479 | P72BO P30BW | .... | San Angelo | ..... |
| | **STONEWALL COUNTY** | | | | | | | | |
| .. | Esperada Mining | 1 Bissitt | 5- 7-53 | 5557 | 5546 | P139BO | 36.1 | Strawn Reef | ..... |
| .. | Seaboard | 3-A Upshaw | 4-18-53 | 6620 | 6235 | P66BO | 37.1 | Ellenburger | ..... |
| .. | Lloyd H. Smith, Inc. | 1 Pumphrey | 1-12-52 | 6304 | 6025 | F226BO | 38.8 | Bend | ..... |
| | **SUTTON COUNTY** | | | | | | | | |
| 89 | W. M. Lyle | 1 G. C. Allison | 10-24-52 | 6585 | 5035 | F20BO F5000 MCF | 61 | Strawn | ..... |
| 89a | Ashland, Felmont | 1 Wallace | 8-27-53 | 6650 | 5026 | F87BO | 33.2 | Strawn Reef | ..... |
| | **TERRELL COUNTY** | | | | | | | | |
| .. | Western Natural | 1 Goode Estate | 1- 5-53 | 5693 | 5490 | F700 MCF | Gas | Pennsy'ian | Goode |
| .. | Humble | 1 Blackstone, et al | 6-11-53 | 12303 | 3405 | F300MCF | Gas | Wichita-Albany | ..... |
| | **TERRY COUNTY** | | | | | | | | |
| 90 | Fullerton | 1 Zorns | 10-24-52 | 10032 | 10008 | F522BO | 44.3 | Cisco | Statex |
| 91 | Cities Production | 1-D Starnes | 1-11-53 | 12140 | 11622 | F575BO | 39.4 | Fusselman | Corrigan, East |
| 92 | O'Neil, Jr., et al | 1 Brownfield | 1-14-53 | 6734 | 6455 | P91BO | 23.3 | Clear Fork | Alex 6700* |
| 92a | Fred Turner, Jr. | 1 Ralls | 1-15-53 | 10086 | 10064 | F121BO | 42.7 | Pennsy'ian | ..... |
| | **TOM GREEN COUNTY** | | | | | | | | |
| 93 | Humble | 1-B Hall | 9- 3-52 | 4964 | 4408 | F243BO | 41.3 | Palo Pinto | Harriett* |
| 94 | La Gloria & Poff | 1 Kent | 4-11-53 | 4755 | 4265 | F44BO | 40.2 | Canyon | Susan Peak, North |
| 95 | W. C. Kinkel | 3 Hall | 6-19-53 | 1131 | 1127 | P20BO P2BW | 30.0 | Feldman | ..... |
| 95a | F. Kirk Johnson & Brooks-Scanlon | 1 Kennemer | 3-26-53 | 6000 | 5756 | F22BO | 43.1 | Strawn | ..... |
| 95b | Schneider | 1 Compton | 4-28-53 | 709 | 702 | P4BO | 28 | San Andres | ..... |
| 95c | Crown Central | 1 Broz | 7- 8-53 | 5410 | 5240 | F149BO | 38 | Ellenburger | ..... |
| 95d | Taylor Oil & Gas | 3-A Rust | 2-22-53 | 4775 | 4513 | F45BO | 34.2 | Strawn | ..... |
| | **UPTON COUNTY** | | | | | | | | |
| 96 | Wilshire | 1-12 Timmins | 1-21-52 | 13587 | 9912 | F314BO | 42.4 | Wolfcamp | Pegasus* |
| 97 | Trebol & Rodman | 1 Radford Grocery | 1-14-53 | 1755 | 1744 | F960BO | 26.0 | U. Grayburg | Rodman-Noel |
| 98 | Woodward & Auld | 1 Corbett | 10- 7-52 | 10897 | 6330 | F337BO | 32 | Clear Fork | Rankin, South |
| 99 | Brown & Thorp and John Parker | 1 Robbins | 2-13-53 | 2261 | 2180 | P24BO P5BW | 26.3 | San Andres | Webb Ray, Southeast |
| 100 | Cities Service | 1-B Noelke | 2- 8-53 | 6882 | 5638 | P12BO P22BW | 32.8 | San Andres | Crockett, East |
| 101 | Gulf | 1 McElroy-State | 1-26-53 | 12762 | 10490 | F403BO | 47.1 | Devonian | AdaMc |
| 102 | J. D. Hancock | 1 Scherck | 1-23-53 | 2805 | 2770 | P61BO | 28 | ..... | ..... |
| 103 | Texas Company | 1 Graf | 5-27-53 | 12645 | 9828 | F544BO F6600 MCF | 58.8 | Strawn | ..... |
| 104 | Buffalo | 1 King Ranch Oil & Lignite Company | 6-16-53 | 5532 | 4783 | F167BO | 35.2 | Wichita-Albany | ..... |
| | **WARD COUNTY** | | | | | | | | |
| 105 | Argo | 1 John Olson | 4-28-53 | 5132 | 4984 | F42BO F29BW | 38.2 | Delaware | Quito |
| 106 | Gulf | 276 Hutchins | 1- 8-53 | 3270 | 2915 | F348BO | 35.2 | L. O'Brien | HSA |
| 106a | Luce & Ice | 1-A Bricton | 7- 2-53 | 6886 | 6706 | F10500 MCF F2800BD | 67.8 | Devonian | ..... |
| | **WINKLER COUNTY** | | | | | | | | |
| 106b | Magnolia | 1-39862 University | 7-13-53 | 5105 | 5099 | F67BO | 67 | Delaware | ..... |
| | **YOAKUM COUNTY** | | | | | | | | |
| 107 | Amerada | 1 Weems | 11- 5-52 | 11860 | 11773 | F1935BO | 43.4 | Devonian | Bronco |
| 109 | H. L. Lowe | 1-L Webb | 4-15-53 | 5318 | 5314 | P25BO | 31 | San Andres | ..... |
| 109a | Skelly | 1 Alton Webb | 8-17-53 | 11890 | ..... | F249BO | 33.8 | San Andres | ..... |

* Denotes new pay in existing field.

# Basin



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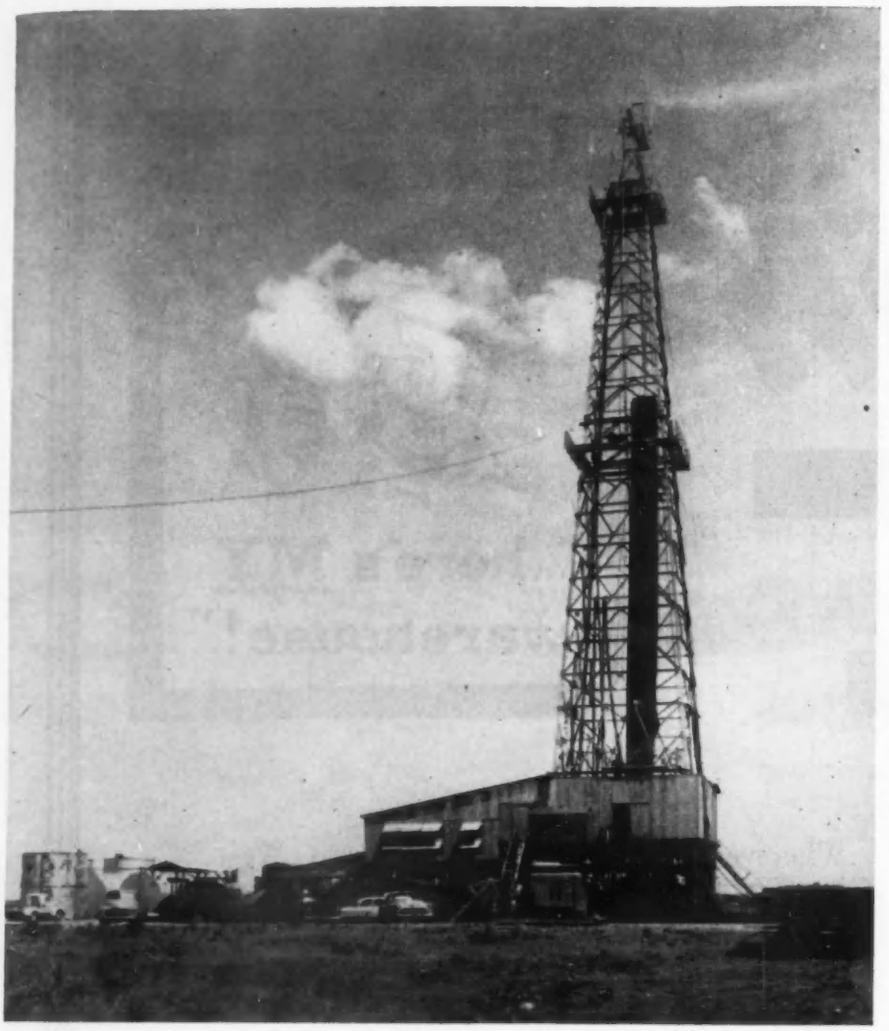

*Photo courtesy Wilson Manufacturing Company, Inc.*

**THE RICHARDSON AND BASS 1 COBB FEDERAL**—a significant 1953 discovery in the Delaware Basin of Eddy County, N. Mex.

# Delaware Basin May Be Next Major Oil Province

- **Five big discoveries in last eight months.**
- **Exploratory drilling and geophysical activity at peak.**
- **10,000 square miles of good prospective oil country.**

**By FREDERICK L. STEAD,** Continental Oil Company, Midland

RECENT DEVELOPMENTS in the Delaware Basin of West Texas and southeastern New Mexico indicate that this relatively unexplored province will be the next major producing area of the vast Permian Basin. The Delaware Basin now embraces 25 oil and two gas fields, comprising about 400 producing wells. Of these fields, five are now shut in, one being a gas discovery in Culberson County, Texas. During the first eight months of 1953, five important discoveries were made, and with continued exploration and drilling activity, new fields will be added to this list.

The Delaware Basin has an areal extent of more than 10,000 square miles, with its major axis trending northwest-southeast for approximately 150 miles. It is bounded (Figure 1) on the east by the central basin platform; on the north by the "buried" Capitan Reef; on the northwest by the Guadalupe Mountains and the exposed portion of the Capitan Reef; on the west by the Sierra Diablo platform; on the southwest by the Apache Mountains (Capitan Reef); on the south by the Davis Mountains arch and "buried" Apache Reef; and on the southeast by the Marathon Uplift and the Glass Mountains (Capitan Reef).

**History.** Common concept of the Delaware Basin is that it is primarily a Permian feature. It is true that the basin is ringed by Upper Permian reefing as defined above, but this represents only its final stages of development. Originally, the Delaware Basin was an early Pennsylvanian basin containing about three times its present areal extent, including the Marfa Basin to the south, portions of the Sierra Diablo platform on the west, and all the area to the north in New Mexico now designated as the Northwestern Shelf.

First Pennsylvanian seas which entered the basin area were restricted to the deepest portions, roughly parallel to its present longitudinal axis. With continued subsidence, the early Pennsylvanian seas became more widespread until they reached their maximum development in Strawn time. This parallels the maximum distribution of the Pennsylvanian seas in the Mid-Continent region during the deposition of the Des Moines series. Lower Pennsylvanian formations (Springer, Morrow, and Bend) in the Delaware Basin are composed mainly of clastics; sands, silts, and black shales predominate, interbedded with thin, sandy limes. This sequence of sediments is considered a typical basin-type section deposited in relatively deep water. In contrast, the Upper Pennsylvanian formations (Strawn, Canyon, and Cisco) are predominantly carbonates, composed of limestones, cherty dolomites, and cal-

careous shales, indicative of shallow seas and shelf-type environments. It was during the Upper Pennsylvanian that the extensive reefs of the northern Midland Basin and Eastern Platform of West Texas were developed. Similar Pennsylvanian reefs are believed to exist within the Delaware Basin area.

With the advent of the first Permian seas, the Wolfcamp series was deposited with angular unconformity upon a folded and faulted Pennsylvanian topography. Lithology of the Wolfcamp section varies considerably throughout the basin and its facies generally reflect the pre-Permian structure. The Lower Wolfcamp (Bursum) is usually composed of conglomerates, black shales, sands, and carbonaceous limestones. The Upper Wolfcamp (Hueco) is generally composed of fossiliferous limestones.

Leonard (Bone Spring) sediments which overlie the Wolfcamp are fairly uniform in lithology, thickness, and extent throughout the basin. The Bone Spring section is generally composed of dark limestones and black shales. Around the western margin of the basin, Leonard (Victorio Peak member) reefing can be observed. It is believed that this early Permian reefing was not localized but occurs about the basin margins and has either not been encountered or has not been recognized in the subsurface to date.

During Guadalupe time, the Delaware Mountain Group (Brushy Canyon, Cherry Canyon, and Bell Canyon formations) was deposited in the Delaware Basin. These formations are mostly sandstones interbedded with black shales and a few thin-bedded limestone members. Bell Canyon sands are overlain by the Lamar black shaly lime which is an excellent subsurface marker throughout the basin and is commonly referred to as the Delaware "black lime." At the margins of the basin, the Bell Canyon sands grade quite rapidly into Capitan Reefing. This rapid lateral gradation can be observed at the entrance to McKittrick Canyon on the east flank of the Guadalupe Mountains. During Upper Guadalupe time Capitan reefing restricted and nearly enclosed the Delaware Basin, defining its geographical limits as we know it today.

The Ochoan Series, which overlies the Guadalupe, is composed of four formations: the Castile (banded anhydrite), the Salado (salt and anhydrite), the Rustler (dolomite and anhydrite), and the Dewey Lake (anhydrite, red beds, etc.). Early Ochoan reefing (Tessey) in the vicinity of the Glass Mountains may have closed the narrow seaway connecting the Delaware Basin with other Permian seas to the south. It is believed the lack of communication with the open sea resulted in the deposition of the extensive Ochoan evaporite deposits.

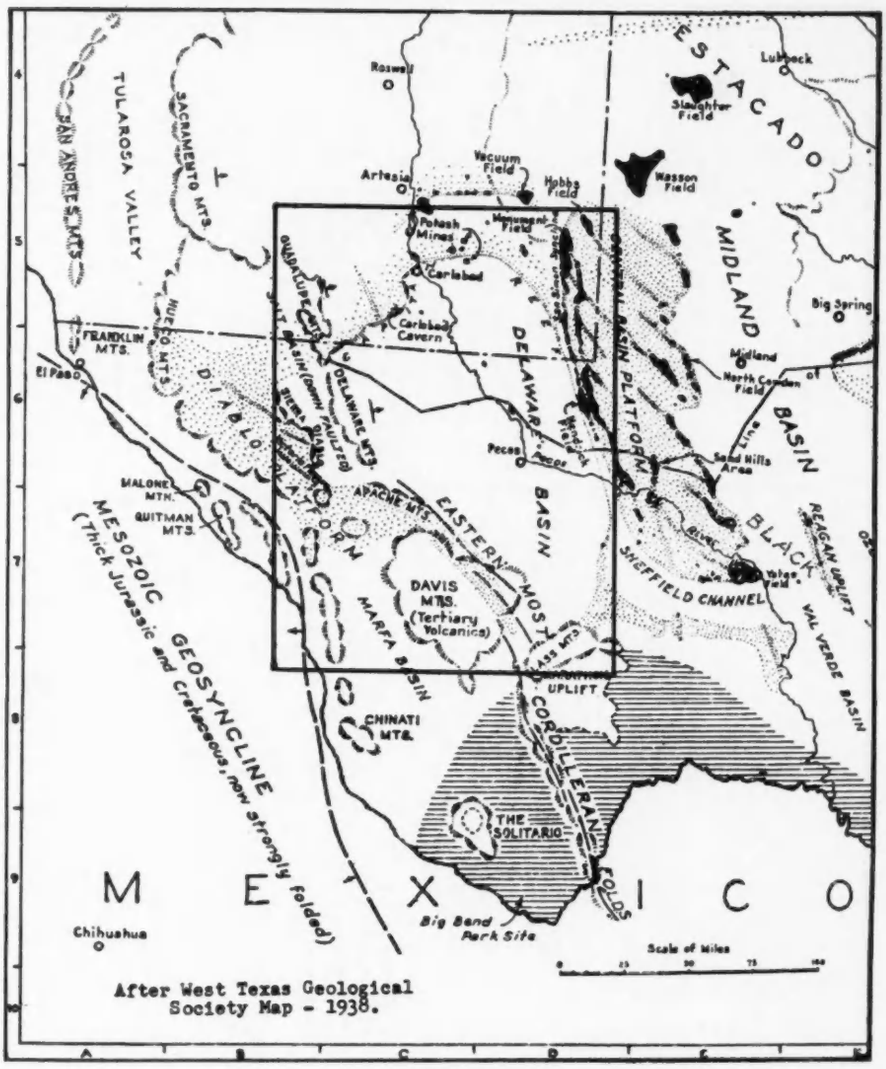


FIGURE 1

**Structure.** Major structural development of the Delaware Basin began in early Pennsylvanian time with gentle regional subsidence. Surface and subsurface evidence of Pennsylvanian diastrophism throughout the southwest indicates it proceeded slowly, accompanied by broad uplifts, arching, folding, and faulting. These structural movements are reflected in the basin sedimentation and account for local unconformities which exist throughout the Pennsylvanian section. These movements continued upward into Lower Permian time and are possibly responsible for the folding and faulting present in the Wolfcamp and Leonard sections. During the Tertiary (Laramide?) disturbances, the western portion of the basin was uplifted and considerably block-faulted. This uplifting tilted the basin to the east, producing a regional dip of 50 feet per mile and rejuvenated the basin tectonic pattern of folding and faulting inherited from Pennsylvanian time.

Subsurface structural data in the basin is currently limited to contours on the Lamar "black lime" (Fig. 2) which overlies the main oil producing zone of the "Delaware sand" throughout the basin.

**Production.** Commercial production within the basin area is currently limited, with a few exceptions, to the upper sands of the Bell Canyon formation, generally referred to as the

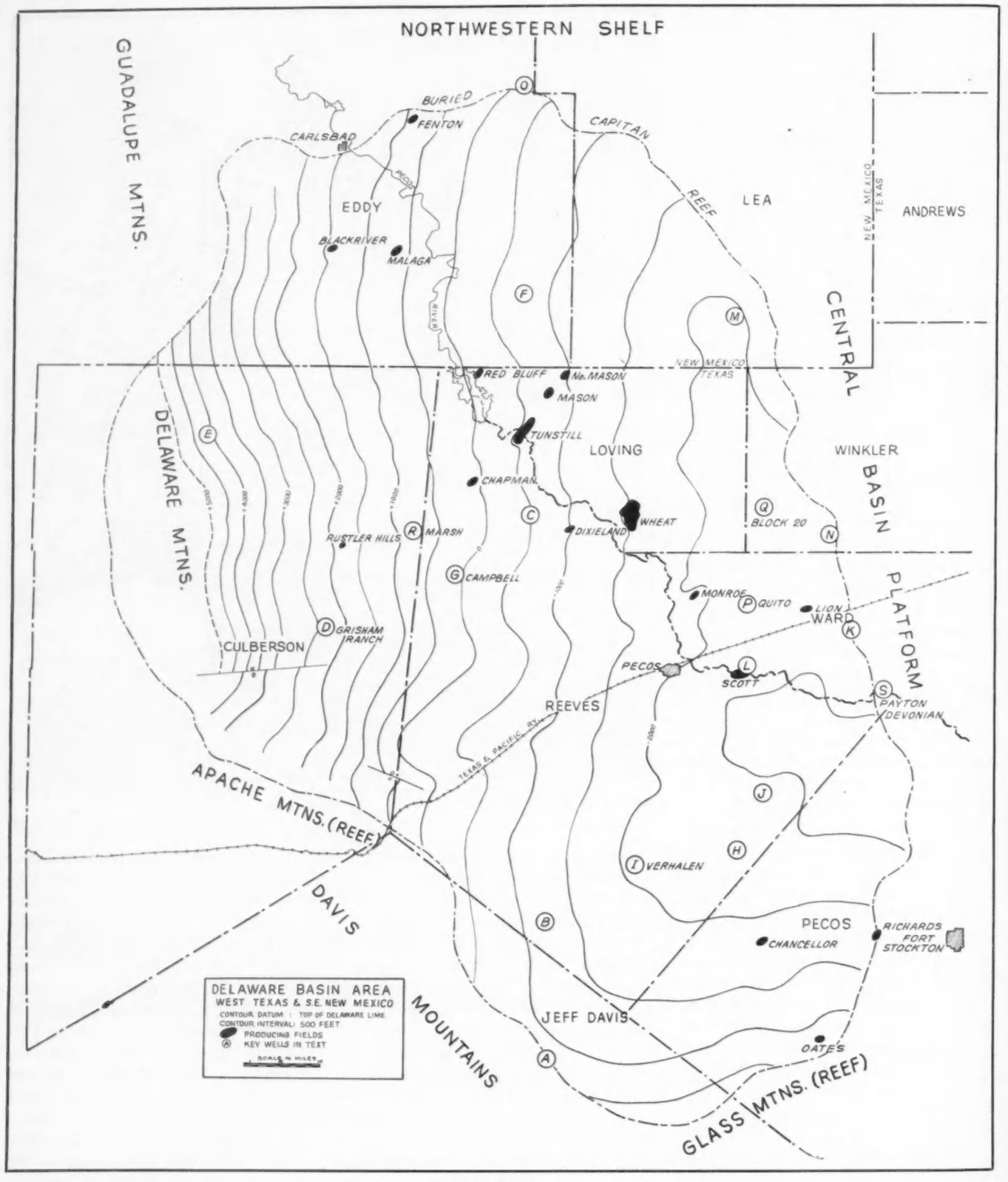


**FIGURE 2.**

"Delaware sand." Better-known Delaware fields are Wheat, Mason, and North Mason fields in Loving County, Tunstill field in Loving and Reeves counties, Chapman and Dixieland fields in Reeves County, the Scott field in Reeves and Ward counties, Lion, Monroe, and Quito fields in Ward County, Chancellor field in Pecos County, and the Black River, Fenton, and Malaga fields of Eddy County, New Mexico. Of these 14 fields, the North Mason, Scott, Quito, and Malaga fields are the major new producing areas developed since 1951 (Table 1). The exceptions referred to (having other than Delaware production) are the Rustler Hills field in Culberson County, the Oates field in Pecos County, and the Jones-Cates field in Eddy County, all of which produce small amounts of low-gravity crude from the Rustler dolomite. The Richards field in Pecos County produced a small amount of oil from the Dewey Lake formation. The Campbell field in Reeves County produces a

small amount of oil from the Castile banded anhydrite.

**Delaware Discoveries.** Seven recent "Delaware Sand" discoveries have started new plays in the basin. The Ralph Lowe No. 1 State "A" test (R) in Culberson County was completed January 11, 1953, pumping 26 barrels of oil per day from the "Delaware sand" at 2670 feet. This area is now designated the Marsh field (Table 2). The Buffalo No. 1 Lindley test (C on map) in Reeves County was completed July 2, 1953, flowing 55 barrels of oil per day plus 62 percent salt water from 3400 feet. This area is yet unnamed. The Magnolia No. 1-39862 State of Texas test (Q) in Winkler County was completed July 18, 1953, flowing 67 barrels of oil per day from the "Delaware sand" at 5100 feet. This area has been named the Block 20 field. All these wells are producing from the first pay or uppermost sand zone. In the Scott field of Ward and Reeves counties, six new Delaware sand pay zones have been discovered by deeper drilling into the Bell Canyon formation. These new pay horizons were found by the Continental No. 1-31 Scott test in this field. The discovery well was completed March 4, 1953, for an initial flowing potential of 251 barrels of oil per day plus 241,000 cubic feet of gas from a new pay 130 feet below the main producing zone. This development has prompted other operators to consider these lower "Delaware sands" to be prospective throughout the basin.

The Argo No. 1 Olson test (P), new pay discovery well in the Quinto field, Ward County, is a case in point. This well was completed April 28, 1953, for 42 barrels of oil per day from 4990 feet (60 feet below the top of the "Delaware sand") after the main pay zone was found to be barren.

**New Trend.** In addition to deeper drilling, another new trend of exploration has recently developed along the north and eastern margins of the basin. The Richardson & Bass No. 1 Cobb-Federal test (O) in Eddy County and the Ralph Lowe No. 1-C University test (N) in Winkler County are both discovery wells with commercial production developed in the fore-reef sands which interfinger updip into the Capitan Reef carbonate section. This stratigraphic trap exists on three sides of the basin area and

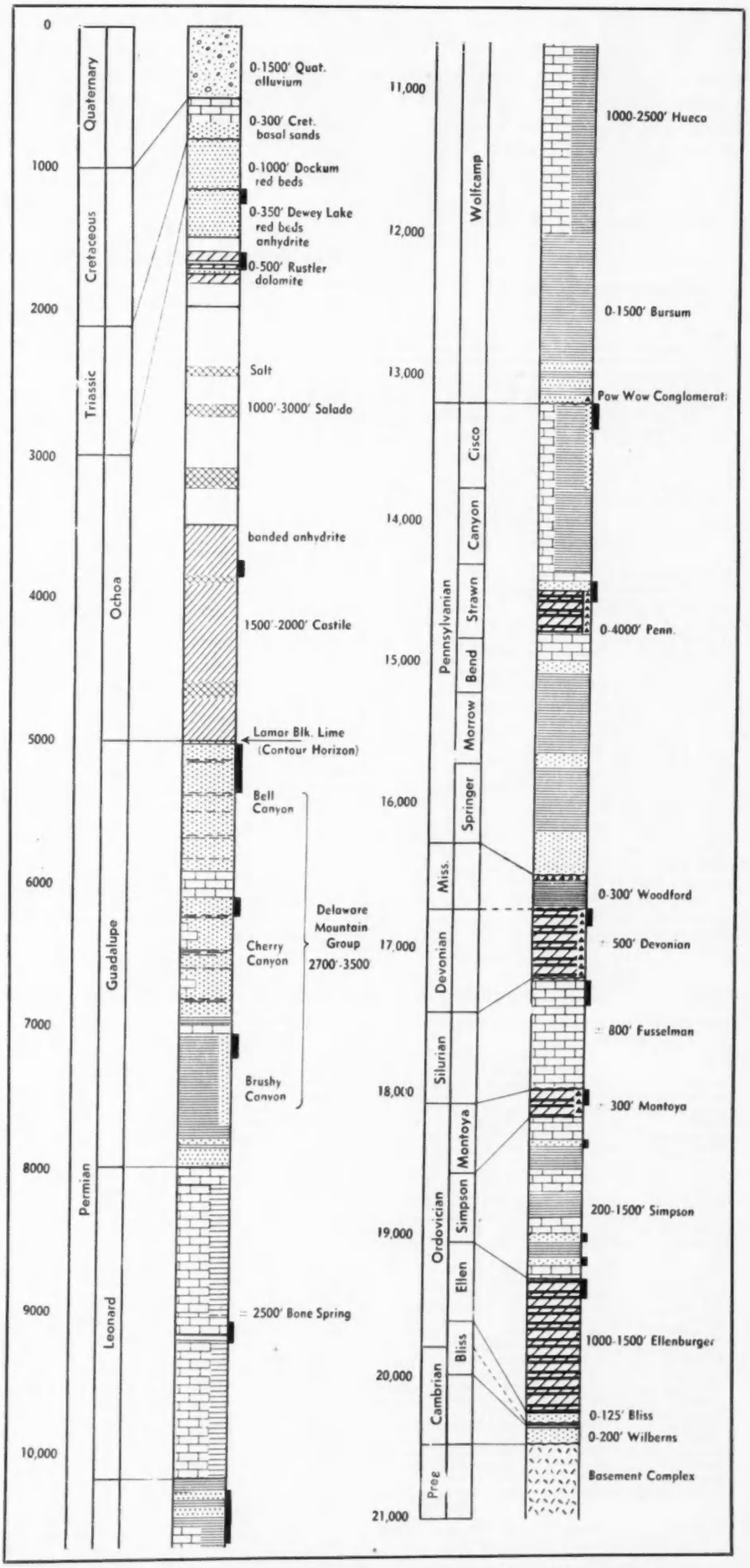


Fig. 3.—Generalized type section of rocks penetrated in Delaware Basin.

has initiated a new Delaware play. The Richardson & Bass well was drilled to 16,459 feet total depth in granite (deepest hole in New Mexico), then plugged back and completed pumping 215 barrels of oil per day from 7100 feet in the Brushy Canyon formation. The Lowe No. 1-C University test recovered 16.5 million cubic feet gas per day plus a spray of 59-gravity distillate from 6100 feet on drill stem test. This well was drilled to 10,242 feet total depth and is now temporarily abandoned.

**Pre-Delaware Discoveries.** The Sun No. 1 Harper-Federal test (M) in Lea County recovered 3600 feet of free oil on drill-stem test from 11,600 feet in the lower Bone Spring formation. The operator is now trying to

## TABLE 1
## Key Wells Referred to in Text

| Map Symbol | Operator, Well, Location, and County | DF Elev. | SEA LEVEL DATUM FOR ALL REPORTED FORMATION TOPS | | | | | | | | | | | | | Total Depth |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rustler | C. Reef | Dela. Ls | Bone Spring | Wolf-camp | Penn. | Miss. | Wood-ford | De-vonian | Silu-rian | Mon-toya | Simp-son | Ellen-burger | |
| A | Continental 1-McCutcheon Est. Sect. 18, Blk. 11, G.H. & S.A., Jeff Davis | 4170 | +2460 | +2300 | ..... | + 135 | —1730 | — 2490 | ..... | —2540 | —2615 | ..... | —3334 | —3965 | —5198 | 9563 |
| B | Miami Oper. 1-Balmorhea Ranches Sect. 84, Blk. 13, H. & G.N., Reeves | 3330 | +1000 | ..... | —1320 | —3360 | —5320 | — 6330 | —6850 | —6940 | —7295 | —7480 | —7570 | —8040 | —9495 | 12925 |
| C | Buffalo 1-Lindley Sect. 8, Blk. 56, Twp. 3, T. & P., Reeves | 2845 | ..... | ..... | — 495 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 3563 |
| D | M. A. Grisham 1-Grisham fee Sect. 10, Blk. 60, Twp. 5, T. & P., Culberson | 3642 | ..... | ..... | +2267 | — 798 | —2908 | — 4958 | ..... | ..... | —5376 | ..... | ..... | ..... | ..... | 9039 |
| E | Magnolia 1-H. Cowden Sect. 12, Blk. 63, Twp. 2, T. & P. Culberson | 3917 | ..... | ..... | ..... | + 877 | —1473 | — 3363 | —5333 | —5718 | —5833 | ..... | —6873 | —7133 | —7348 | 11651 |
| F | Richardson & Bass 1-Harrison-Federal Sect. 12, T25S, R30E, Eddy | 3378 | ..... | ..... | — 666 | —4502 | —7442 | —10357 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | drilling |
| G | F. Campbell 1-Hickey Sect. 17, Blk. 56, PSL, Reeves | 3241 | +2704 | (T/Castle+1318) | | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 3186 |
| H | Gulf-Frost 1-Northrup Sect. 33, Blk. 50, Twp. 8, T. & P., Reeves | 2830 | ..... | ..... | —2330 | —5226 | —7213 | —12090 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 16695 |
| I | Argo 1-Roberts Sect. 294, Blk. 13, H. & G.N., Reeves | 2880 | +1590 | ..... | —2272 | —4960 | —7140 | — 9840 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 14073 |
| J | Magnolia 1-Rape Sect. 24, Blk. C-1, PSL, Reeves | 2757 | ..... | ..... | —2443 | —5153 | —7325 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | drilling |
| K | Phillips 1-B University Sect. 28, Blk. 16, Univ. Lds., Ward | 2652 | + 817 | — 778 | ..... | —3818 | —5762 | — 7848 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 11996 |
| L | Continental 1-Watson Sect. 32, Blk. 33, H. & T.C., Ward | 2550 | +1300 | ..... | —2255 | —5420 | —7800 | —10700 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 14878 |
| M | Sun 1-Harper-Federal Sect. 26, T25S, R35E, Lea | 3116 | ..... | ..... | —1934 | —5744 | —8904 | —10194 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 14975 |
| N | R. Lowe 1-C University Sect. 38, Blk. 21, Univ. Lds., Winkler | 2736 | ..... | —1824 | ..... | —5144 | —5589 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 10209 |
| O | Richardson & Bass 1-Cobb-Federal Sect. 23, T20S, R31E, Eddy | 3515 | ..... | +1125 | ..... | —3949 | —7145 | —8685 | —9875 | —10723 | —10878 | ..... | ..... | —12185 | —12458 | 16459 |
| P | Argo 1-Olson Sect. 191, Blk. 34, H. & T.C., Ward | 2677 | ..... | ..... | —2230 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 5076 |
| Q | Magnolia 1-39862 U.-Tex. Sect. 11, Blk. 20, Univ. Lds., Winkler | 2799 | ..... | ..... | —2273 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 5105 |
| R | R. Lowe 1-State "A" Sect. 9, Blk. 45, PSL, Culberson | 3185 | +2883 | ..... | + 548 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 3024 |
| S | Luce & Ice 1-A Brietson Sect. 6, Blk. 32, H. & T.C., Ward | 2439 | ..... | ..... | (Yates + 549) | — 908 | —3600 (?) | —3969 | —3986 | —4091 | —4252 | ..... | ..... | ..... | ..... | 6880 |

## TABLE 2
## Producing Fields in Delaware Basin of West Texas and New Mexico

| Field Name | County | Dis-covery Date | Discovery Well | Avge. Surf. Elev. | Avge. Total Depth | Age of Prod. | Producing Formation | Type of Trap | Prod-ucing Wells 9-1-1953 | Avge. Allow. BOPD | Max. Pay Thick-ness | Avge. IP BOPD | Avge. Gravity API. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Grisham Ranch | Culberson | 1952 | Grisham 1-fee | 3650 | 9050 | Devonian | Devonian | Faulted ant. | 1 | .. | .. | 9.75 MMCFG | .. |
| Marsh | Culberson | 1952 | R. Lowe 1-State "A" | 3180 | 2900 | Permian | Bell Canyon | Plunging nose | 1 | 26 | 22 | 26 | 22 |
| *Rustler Hills | Culberson | 1948 | Mills 1-Fisher | 3450 | 480 | Permian | Rustler | Unknown | 0 | .. | 30 | 21 | 30 |
| Black River | Eddy | 1937 | Collins 1-Weiler-Gov't. | 3270 | 1970 | Permian | Bell Canyon | Terrace | 2 | 45 | 15 | 15 | 41.5 |
| *Fenton | Eddy | 1943 | Schuster & Messinger 1-Page | 3320 | 2650 | Permian | Bell Canyon | Strat. trap | 0 | .. | 11 | 20 | 40 |
| Malaga | Eddy | 1951 | So. Calif. Pet. 1-Valley Land | 2965 | 2770 | Permian | Bell Canyon | Plunging nose | 23 | 45 | 17 | 58 | 43 |
| Jones-Cates | Eddy | 1952 | B. Jones 1-Cates-Fed. | 3200 | 885 | Permian | Rustler | Unknown | 1 | 45 | 6 | 20 | 22.6 |
| Unnamed | Eddy | 1953 | Richardson & Bass 1-Cobb-Fed. | 3500 | 7200 | Permian | Brushy Canyon | Strat. trap | 1 | 105 | 30 | 215 | 40 |
| Wheat | Loving | 1925 | Sinclair 1-Wheat | 2750 | 4300 | Permian | Bell Canyon | Terrace | 116 | 35 | 30 | 100 | 38 |
| Mason | Loving | 1937 | Mason 2-Kyle | 3075 | 4000 | Permian | Bell Canyon | Plunging nose | 18 | 35 | 15 | 150 | 39 |
| North Mason | Loving | 1952 | Ohio 1-A Kyle | 3050 | 4100 | Permian | Bell Canyon | Plunging nose | 15 | 93 | 15 | 100 | 38 |
| Red Bluff | Loving | 1953 | Floyd 1-Johnson | 2800 | 3200 | Permian | Bell Canyon | Plunging nose | 1 | 58 | 10 | 58 | 42 |
| Tunstill | Loving | 1947 | L. Crouch 1-Tunstill | 2800 | 3400 | Permian | Bell Canyon | Terrace | 166 | 50 | 10 | 150 | 42 |
| Chancellor | Pecos | 1942 | Pure 1-A Fraser | 3310 | 5400 | Permian | Bell Canyon | Anticline | 2 | 14 | 24 | 62 | 38 |
| Oates | Pecos | 1947 | Pure 1-Oates | 3530 | 850 | Permian | Rustler | Anticline | 2 | 43 | 60 | 39 | 19 |
| *Richards | Pecos | 1929 | Phillips 1-Pryor | 2940 | 1400 | Permian | Dewey Lake | Unknown | 0 | .. | 80 | 150 | 35 |
| Campbell | Reeves | 1951 | Campbell 1-Hickey | 3240 | 1950 | Permian | Castile | Unknown | 1 | 28 | 30 | 28 | 29 |
| Chapman | Reeves | 1948 | Chapman 1-Randolph | 2950 | 2900 | Permian | Bell Canyon | Terrace | 13 | 47 | 25 | 200 | 35 |
| Dixieland | Reeves | 1948 | C. & B. 1-Anderson | 2770 | 3900 | Permian | Bell Canyon | Terrace | 7 | 38 | 15 | 75 | 35 |
| *Verhalen | Reeves | 1947 | Argo 1-Roberts | 2875 | 10000 | Permian | Wolfcamp | Anticline | 1 | 72 | 800 | 72 | 43 |
| Unnamed | Reeves | 1953 | Buffalo 1-Lindley | 2850 | 3560 | Permian | Bell Canyon | Plunging nose | 1 | 55 | 10 | 55 | 32 |
| Lion | Ward | 1944 | Lion 1-B Univ. | 2655 | 5000 | Permian | Bell Canyon | Anticline | 4 | 20 | 20 | 122 | 35 |
| Monroe | Ward | 1930 | Shipley 1-Monroe | 2650 | 4700 | Permian | Bell Canyon | Terrace | 12 | 18 | 15 | 40 | 33 |
| Quito | Ward | 1940 | Slack 1-Hayes | 2720 | 5100 | Permian | Bell Canyon | Plunging nose | 3 | 100 | 40 | 156 | 39 |
| Scott | Ward | 1945 | Continental 1-Scott | 2550 | 5200 | Permian | Bell Canyon | Plunging nose | 6 | 34 | 140 | 120 | 38 |
| Payton Devonian | Ward | 1953 | Luce & Ice 1-A Brictson | 2440 | 6880 | Devonian | Devonian | Wedgeout | 1 | .. | 100 | {105 MMCFG {299 Distillate | 67 |
| Block 20 | Winkler | 1953 | Magnolia 1-39862 Utex | 2800 | 5100 | Permian | Bell Canyon | Plunging nose | 1 | 67 | 10 | 67 | 40 |

* Shut in.

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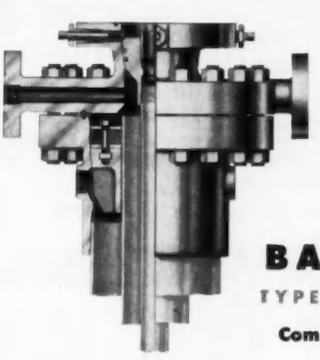

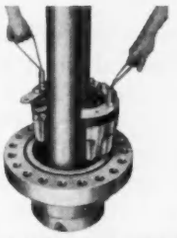

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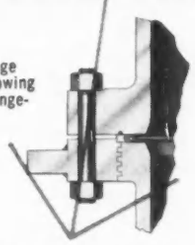
Type "UPS" Heads—a new Baash-Ross development—have the Packing Element and Slips unitized into a *single* hinged assembly that simply w-r-a-p-s around the casing and locks in place with one bolt. As the weight of the casing is placed on the slips, they *automatically* equalize themselves within the bowl to assure exact centering of the casing as well as a uniform grip around the *entire circumference* of the pipe. A few quick turns of a wrench then expands the packing element for a pressure-tight seal.

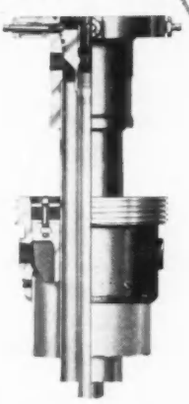
**"UPS" ADVANTAGES INCLUDE** . . . (1) No space wasted by threads, grooves or other packer-retaining devices—therefore overall height is reduced to a minimum . . . (2) Elimination of threads, grooves, etc., means a smooth bowl—nothing to become damaged during drilling operations, no need for protective sleeves . . . (3) Since all the slip segments are unitized together, none can set higher or lower than the rest—no risk of crimping the casing, no danger of an unequal grip that may fail in service . . . (4) Slips are set and packing is tightened around casing without stripping and without first cutting the casing. Simplifies installation—saves time!

"UPS" Heads also incorporate the unique Baash-Ross weld-testing feature which permits simultaneously testing the pressure-tightness of *both* casing welds with a gauge and hand pump as part of the installation procedure—or any time later. Any leaks discovered during the life of the well can be quickly sealed off by injecting plastic pack material.

"UPS" Equipment is available in a complete range of sizes . . . for threading or welding to the casing . . . with or without Bases . . . and for use with over a dozen different Tubing Heads Suspensions and Hook-Ups. *It is the ideal solution for a wide range of requirements on medium and low-pressure wells!*

View of Flange installed showing packing arrangement.





### BAASH-ROSS
TYPE "UPS-DF" HEADS

**Offer "UPS" Advantages**
***Plus Demountable Flanges***

Type "UPS-DF" Heads combine all the "UPS" advantages with an additional important feature—*Demountable Flanges that can be salvaged after the drilling operations for use on other installations.*

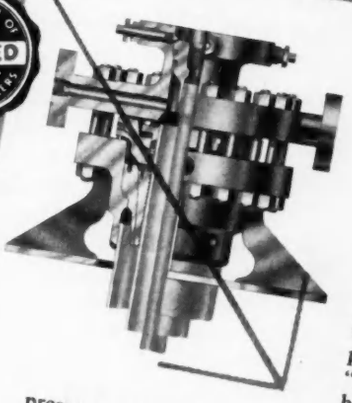
The body, packing and slips of this design are the same as standard "UPS" Heads to provide all the important "UPS" advantages outlined at left. However, the flange is attached to the main body by means of a square thread so that it can be readily removed when drilling operations are completed.

During drilling, the flange is installed on the Head to provide means for attaching standard pressure control. A unique packing arrangement—having important advantages over the conventional ring-groove design—prevents leakage between the flanges and is so placed that the square thread is not exposed to casing pressure.

After drilling is completed, the pressure control equipment is removed and the flange is unscrewed from the Head—an operation simplified by the easy make-and-break properties of the square thread. The flange, ring bolts and packing can then be used repeatedly on other wells, thus effecting important economies on multiple installations.

Available in a complete range of sizes and designs, Type "UPS-DF" equipment is the latest in a long string of Baash-Ross Landing and Casing Head advancements. *Be sure to investigate the economies this equipment can make for you!*

ASSOCIATION OF WELL HEAD EQUIPMENT MANUFACTURERS CERTIFIED



### BAASH-ROSS
TYPE "X" HEADS

**Provide Vital Advantages for High-Pressure Installations.**

Developed several years ago to give new efficiencies on high-pressure wells, Type "X" equipment has been widely used on wells of all depths and pressures. It offers unusual simplicity, compactness and adaptability to different installation requirements, and the heavy-duty pack-off provides a dependable seal against the highest well pressures. The pack-off is made in a separate unit that fits between flanges—a pressure-tight seal being formed around the casing by a double-element Packing Assembly tightened by stud bolts.

**TYPE "X" ADVANTAGES INCLUDE** . . . (1) No grooves or threads in bowl to become damaged during drilling operations . . . (2) One-piece Packing Assembly mounts between flanges for maximum space saving . . . (3) Unitized Slips assure uniform slip pressure . . . (4) Packing Assembly and casing weld are so designed that seal around casing can be checked at any time during life of the well, and repaired with plastic material *without even breaking connections* . . . (5) Series ratings and flange sizes can be easily changed in the Head.

Type "X" Heads are available in a complete range of sizes, pressures and variations to meet every well requirement!

Baash-Ross Well Head Equipment is available through leading supply stores.

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complete the well in this zone. The Continental No. 1 Watson test (L) in Ward County recovered 2450 feet of free 38° gravity oil on a drill-stem test at 9250 feet. This recovery was made from the same zone of the lower Bone Spring formation. This horizon is stratigraphically equivalent to the Lower Spraberry of the Midland Basin and may represent a similar producing reservoir in the Delaware Basin.

The Magnolia No. 1 Rape well (J) in Reeves County is an indicated discovery from the Wolfcamp at 10,100 feet. This is the same zone from which the Argo No. 1 Roberts well (I) was completed in 1947 as the discovery well in the Verhalen Wolfcamp field. The Argo well produced for several years but is now shut in. The Richardson & Bass No. 1 Harrison-Federal test, drilling wildcat (F) in Eddy County, was another indicated Wolfcamp discovery. This well flowed 2.32 million cubic feet gas plus 192 barrels distillate per day from 12,216 feet on drill stem test. Operator was drilling ahead in the Pennsylvanian section below 15,500 feet.

Along the west flank of the basin the M. A. Grisham No. 1 Fee well (D) in Culberson County was completed in April, 1952, as a Devonian gas discovery from 9034 feet. This well was potentialed for 9.75 million cubic feet gas per day and has since been shut in. The Grisham-Hunter Corporation No. 1 State-Fee, a confirmation test, is currently drilling one mile west of the discovery well.

The Devonian along the eastern margin of the basin is also receiving attention. The Luce & Ice No. 1-A Brictson well (S), discovery well of the Payton Devonian field in southern Ward County, was completed June 30, 1953, at 6700 feet for a calculated open flow 105 million cubic feet gas plus 299 barrels 67 gravity distillate per day. This Devonian discovery along the east margin of the Delaware Basin has touched off another deep play similar to that of a year ago along the west flank of the Midland Basin.

**Important Dry Holes.** Numerous deep dry holes drilled in the basin area have encountered favorable shows of oil and gas. These "near misses" are well distributed geographically and deserve honorable mention. The Continental No. 1 McCutcheon Estate test drilled (A) in Jeff Davis County encountered an impressive number of oil shows. Oil and gas shows were logged at successive intervals from the basal Cretaceous sands at 1000 feet through the whole Paleozoic section all the way to the Ellenburger formation at 9563 feet total depth. Best shows were logged in the Silurian and Montoya sections. The Magnolia No. 1 Cowden test (E) in Culberson County encountered numerous gas shows in the Pennsylvanian section at 8200 feet. The Miami Operators No. 1 Balmorhea Ranches test (B) in southern Reeves County nearly made a Wolfcamp gas well at 8900 feet. The Phillips No. 1-B University test (K) in Ward County also had gas and oil shows in the Wolfcamp section at 9400 feet. Although none of these tests encountered hydrocarbons in commercial quantities, neither have they condemned the province. Instead, these "dry holes" indicate the whole basin area to be good oil country. Marine sedimentary sections penetrated to date contain an abundance of petroleum source beds and reservoir rocks. All formations that have carried oil and/or gas shows are so marked on the generalized columnar section (Figure 3).

**About the Author**

FREDERICK L. STEAD is district geologist in Continental Oil Company's Midland, Texas, headquarters. He studied geology at the College of Wooster, Wooster, Ohio, from 1941 to 1943 when he entered the U. S. Army Air Force, serving as a B-29 navigator until his discharge in November, 1945. He returned to Wooster and received his B.A. degree in geology in 1947. On a Teaching Fellowship, he entered the graduate school at the University of Texas, where he became an instructor and served on the geology faculty for 2½ years, teaching micropaleontology and subsurface geology. He received his masters degree in geology in 1950, and joined Continental at Midland in 1951. He was made district geologist in March, 1953.

**Future Prospects.** The Delaware Basin contains over 10,000 square miles of area and an estimated 25,000 cubic miles of marine sediments. To date the proven acreage consists of approximately 100 square miles of shallow "Delaware sand" production while only about 50 square miles have been condemned by its 42 deep dry holes. Numerous oil shows encountered in all horizons penetrated and the widespread occurrence of potential reservoir rocks indicate that this large basin may very well be the next major oil province of West Texas.

Prospects for finding additional shallow "Delaware sand" production are excellent. The large number of recent new field discoveries, the realization that many lower "Delaware sand" zones may also be productive, and the fore-reef play around the margins of the basin suggest the coming year will see an increase in drilling activity by both independent and major companies. Deep plays have already been initiated by the recent discoveries of Bone Spring, Wolfcamp, and Devonian production. Pennsylvanian and Ordovician strikes are expected if the current deep drilling campaign continues.

Exploration activity has been at its peak. Twenty seismograph crews and six gravity crews have operated in the basin during the past year, and at least half of these continuously. Core drill projects and surface geology parties have also been observed. This activity is expected to increase since most large acreage holdings originally taken at the close of World War II will expire during the next three years.

During 1951, 1952, and the first half of this year, 115 wildcats were drilled in the Delaware Basin. Of this total, 87 were shallow "Delaware sand" tests, and 28 were deep pre-Permian tests. One-sixth of these were successful and are considered to be discoveries. This exploratory drilling represents an increase of nearly 50 percent over the previous five-year post-war period, indicating more and more operators are looking toward the Delaware Basin as the next major producing area of the Permian Basin.

—The End

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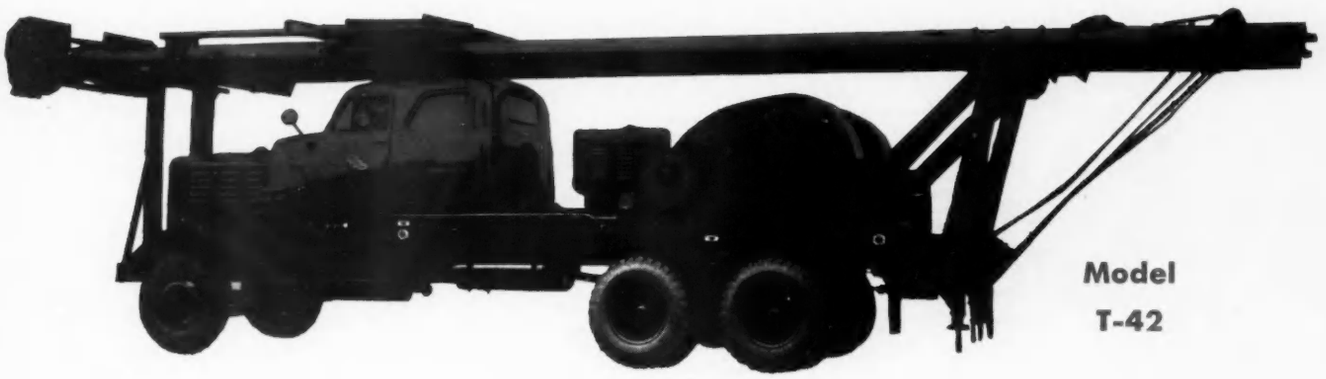

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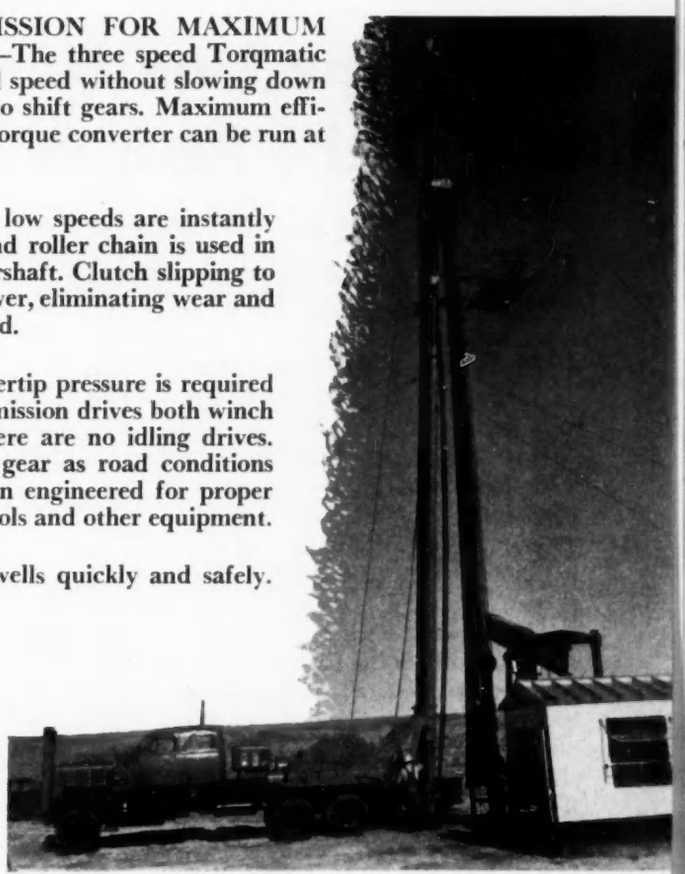

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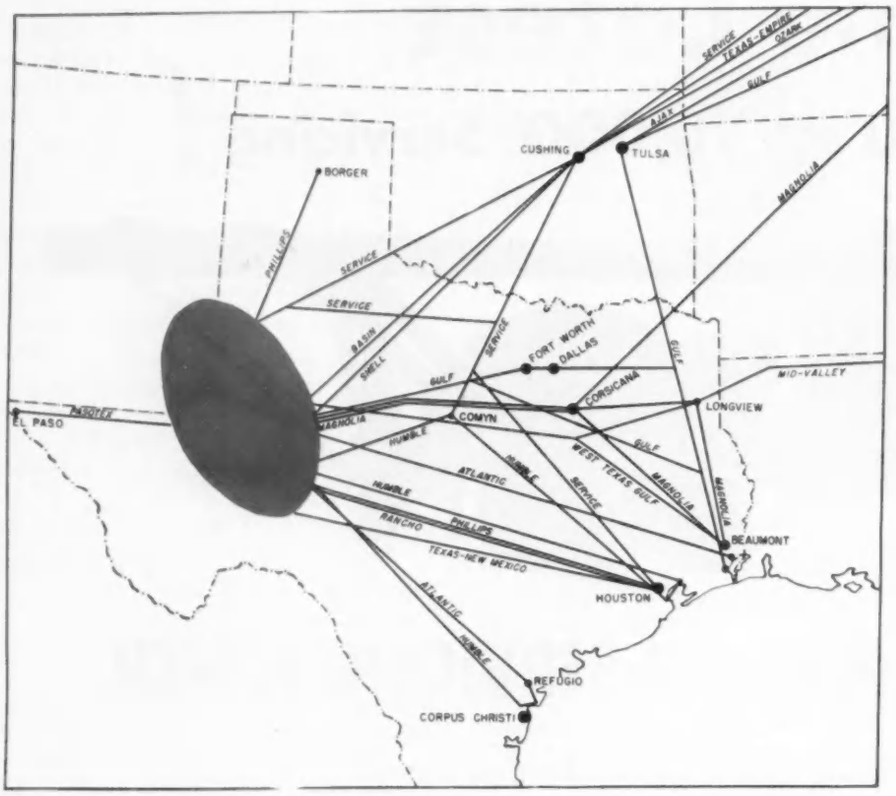


# Vast Pipe Line Network Serves the Permian Basin

**By CECIL W. SMITH,** WORLD OIL Staff

THE PERMIAN BASIN, one of America's greatest oil producing regions, today is adequately served by a gigantic system of gathering and trunk pipe lines. Until recently, pipe line outlets were not of sufficient capacity to move this West Texas and New Mexico area's growing production to the nation's refining centers where it was needed.

This network of 16 large trunk pipe lines now carries the basin's output of 1,300,000 barrels of crude daily and still has a reserve capacity of about 300,000 barrels a day. If and when there becomes a need, the two newest lines can be increased 255,000 a day simply by addition of pump stations. It appears, that the shortage of transportation for Permian Basin crude that existed after World War II is a thing of the past and need never be repeated.

Two of the finest crude pipe line systems in the world were completed from the Permian Basin this year. One carries entirely for the Gulf Coast, while the other shares its load with the Ohio Valley region, and the two together have capacity of 530,000 barrels daily, which would have been enough to move the basin's entire 1944 crude output.

The first to be put into operation in 1953 was the Rancho Pipe Line System, owned by seven pipe line companies and terminating in the Houston area of the Gulf Coast. This line is capable of carrying 210,000 barrels daily and with the addition of more pumping stations would have capacity of 345,000 barrels. The carrier consists of 457 miles of 24-inch pipe.

The basin's newest outlet was the West Texas Gulf Pipe Line Company's system, which was built by five major oil conpanies. This 465-mile 26-inch giant is the largest crude pipe line in America and is capable of carrying 320,000 barrels of Permian Basin crude a day and someday will probably be upped to 440,000 by addition of pump stations. Along the way, it sends a 20-inch branch to help feed the great Mid-Valley Pipeline's system. The main artery continues to the Beaumont area of the Gulf Coast.

The 16 trunk lines now operating have a rated capacity of 1,608,900 barrels per day. Currently, crude production in the region is about 300,000 barrels less than that figure. Daily capacity to the Gulf Coast is approximately 800,000 barrels, and facilities capable of carrying about 700,000 barrels are available to Midwestern and Mid-Continent refineries.

Two trunk systems from the region are not now being used. Gulf's three 10-inch parallel lines to Ranger are now idle, and Shell's 10-inch to Houston, which parallels the new Rancho line, has been sold to Phillips Pipe Line Company and is plugged with water at present. —**The End**

**Crude Trunk Lines Out of Permian Basin**

| LINE OWNER— | Gathering Line Terminal | Destination | Pipe Size (Inches) | Daily Capacity (Barrels) |
|---|---|---|---|---|
| Atlantic Pipe Line Company | Midland | Atreco | 10 | 46,000 |
| Atlantic Pipe Line Company | Crane | Harbor Island | 10 | 32,000 |
| Basin Pipe Line System | Midland | Cushing, Okla. | 22 | 250,000 |
| Gulf Refining Company* | Midland | Ranger | (3) 10 | 126,000 |
| Humble Pipe Line Company | Kemper | Ingleside | (2) 10 & 12 | 73,000 |
| Humble Pipe Line Company | Kemper | Webster | (2) 8 | 49,000 |
| Humble Pipe Line Company | Kemper | Satsuma | 18 | 132,000 |
| Magnolia Pipe Line Company | Midland | Beaumont | 8 | 23,500 |
| Magnolia Pipe Line Company | Midland | Corsicana | 12 | 90,000 |
| Pasotex Pipe Line Company | Wink | El Paso | 8 | 45,000 |
| Phillips Pipe Line Company | Goldsmith | Borger | 12 | 73,000 |
| Phillips Pipe Line Company* | McCamey | Houston | 10 | 36,000 |
| Rancho Pipe Line System | Mesa | Houston | 24 | 210,000 |
| Service Pipe Line Company | Sundown | Drumright, Okla. | 16 | 166,400 |
| Service Pipe Line Company | Cogdell | Bowie | 10 | 33,000 |
| Shell Pipe Line Company | McCamey | Cushing, Okla. | 10 | 23,000 |
| Texas-New Mexico Pipe Line Company | Crane | Houston | 12 | 43,000 |
| West Texas Gulf Pipe Line Company | Colorado City | Longview and Beaumont | 26 | 320,000 |
| Total | | | | 1,770,900 |

* Pipe line currently not operating. Figures in parentheses denote number of parallel lines.

# Basin Has 12 Percent of U. S. Rigs

**• Despite a slump, West Texas-Southeastern New Mexico is still a leading drilling area.**

**• 2063 wells completed this year exceeded only by North Texas, Oklahoma, and Kansas.**

**• Almost 15 million feet of hole is larger than any other regional total.**

**• Region promises to be a top ranking drilling area for many years to come.**

THE PERMIAN BASIN region of West Texas and Southeastern New Mexico is a top ranking drilling area of the U. S. While a slump in drilling activity from levels of the preceding three years has been the cause of considerable comment, little attention has been given the high rate of current operations. The territory still is topping all other sectors in footage drilled, and outranks all but the leaders in rigs running and number of new wells being completed.

The 589 rigs running in West Texas-Southeastern New Mexico on July 31, 1953, compared with 627 operating a year ago and with 733 two years ago on this date. Nevertheless, the 589 rigs working the end of July represented 12 percent of the nation's total. Oklahoma was the only territory with more rigs operating, having 601. In contrast, Kansas had only 466 rigs running, North Texas 368, California 260, and Louisiana 248.

With fewer rigs running, new wells completed have slumped from the abnormally high level of the past three years. However, the region still outranks most other areas. The 2063 wells completed during the first seven months of this year was exceeded only by North Texas, Oklahoma, and Kansas.

Footage drilled is another story. Although off from rates of preceding recent years, the 14¾ million feet of hole represented by completions during the first seven months of this year was larger than that of any other region, even exceeding the 14⅓ million feet drilled in completing 4052 wells in Oklahoma.

Only other area to rank close was North Texas, as evidenced by the completion of less than half as much footage in California. The Permian Basin accounted for over 13 percent of all the hole drilled in the nation during the first seven months of 1953.

Drilling activity in the Permian Basin is off, but still tops most other regions of the country.

Slump in the area's drilling activity is due to reduced operations in the West Texas sector because of the drop in Spraberry work. On the other hand, operations in the New Mexico region are expanding to new peaks this year in all phases. Drilling operations during the first seven months of 1953 indicate a record number of both wells and footage.

In the West Texas sector 2112 wells were completed and 11 million feet of hole drilled during the first seven months, compared with 3539 wells and over 20 million feet of hole during the corresponding period of 1952. Nevertheless, the West Texas sector still accounted for 7.7 percent of the nation's wells and 10.3 percent of the nation's footage.

West Texas-Southeastern New Mexico in all likelihood will continue to be a top ranking drilling area for many years to come. It is still a leader in discovery of new fields and new pay horizons, and as long as this is true it will remain an active drilling territory. **—The End**

**Permian Basin Drilling**

| | NEW WELLS COMPLETED | | FOOTAGE DRILLED | | RIGS RUNNING ON JULY 31 | |
|---|---|---|---|---|---|---|
| | No. | Percent of U.S. | Amount | Percent of U.S. | No. | Percent of U.S. |
| **TOTAL PERMIAN BASIN: (West Texas and Southeast New Mexico):** | | | | | | |
| Seven Months, 1953 | 2,603 | 9.5 | 14,731,628 | 13.3 | 589 | 12.1 |
| Seven Months, 1952 | 4,015 | 14.7 | 23,784,215 | 21.2 | 627 | 13.4 |
| Year, 1952 | 5,838 | 12.7 | 34,695,194 | 18.6 | 627 | 13.4 |
| Year, 1951 | 5,923 | 13.2 | 32,278,274 | 18.5 | 733 | 14.7 |
| Year, 1950 | 5,596 | 12.9 | 29,369,191 | 18.4 | 689 | 14.6 |
| Year, 1949 | 3,768 | 9.6 | 18,614,504 | 13.4 | 505 | 12.6 |
| **WEST TEXAS—(Dist. 7-C and 8):** | | | | | | |
| Seven Months, 1953 | 2,112 | 7.7 | 11,404,678 | 10.3 | 459 | 9.4 |
| Seven Months, 1952 | 3,539 | 13.0 | 20,826,046 | 18.5 | 519 | 11.1 |
| Year, 1952 | 5,125 | 11.2 | 30,046,661 | 16.1 | 519 | 11.1 |
| Year, 1951 | 5,383 | 12.0 | 29,293,100 | 16.8 | 643 | 12.9 |
| Year, 1950 | 5,054 | 11.7 | 26,894,552 | 16.8 | 603 | 12.8 |
| Year, 1949 | 3,284 | 8.4 | 16,417,982 | 11.8 | 426 | 10.6 |
| **SOUTHEAST NEW MEXICO:** | | | | | | |
| Seven Months, 1953 | 491 | 1.8 | 3,326,950 | 3.0 | 130 | 2.7 |
| Seven Months, 1952 | 476 | 1.7 | 2,958,169 | 2.7 | 108 | 2.3 |
| Year, 1952 | 713 | 1.6 | 4,648,533 | 2.5 | 108 | 2.3 |
| Year, 1951 | 540 | 1.2 | 2,985,174 | 1.7 | 90 | 1.8 |
| Year, 1950 | 542 | 1.2 | 2,474,639 | 1.6 | 86 | 1.8 |
| Year, 1949 | 484 | 1.2 | 2,196,522 | 1.6 | 79 | 2.0 |

# New Mexico Drilling Still Active

## 726 new locations staked in four-county area of Eddy, Lea, Chaves, and Roosevelt.

**By KEITH ANDERSON,** *Five Star Oil Report*, Midland, Texas

THE AGGRESSIVE search for oil continued during the past year in Southeastern New Mexico with the area experiencing a number of significant developments. A total of 726 new locations were staked in the four-county area comprising Lea, Eddy, Chaves, and Roosevelt counties.

Of this number, Lea County leads the field with 549 new locations staked, Eddy County follows with 151 locations, Chaves County had 21, and 5 in Roosevelt County.

During the past year, Lea County had 496 wells completed as oilers plus 20 gas wells. Total of 67 projects were plugged and abandoned. Eddy County had 89 new wells placed on production, 32 failing to produce commercially. Five new producers were added in Chaves County, all oil wells. Roosevelt County did not gain a single producer.

This gave the four-county area a combined total of 610 new oil and gas wells completed during the past year, and 120 wells plugged and abandoned, of which most were wildcats seeking deep Pre-Permian production.

Chaves County, with four active rotary rigs, had four new pools added, one shallow discovery and three deep discoveries from Pennsylvanian and Devonian.

A new record depth for the state was set in Eddy County at 16,459 feet by Richardson & Bass Cobb-Federal 1, Delaware Basin discovery, and five new pools were opened from Permian or Pre-Permian formations. Activity for the county is highlighted by three 15,000-foot plus ventures among the eight rigs now in operation.

Lea County has had 13 new pools discovered during the past 12 months, 10 of which opened production at depths in excess of 8000 feet. Lea County has been the most active county in the Permian Basin during the past year, with from 110 to 125 rotary rigs operating steadily.

**Chaves County.** Chaves County created quite a stir among the "oil seekers" with the completion of two important wildcat discoveries, pushing the search for Pre-Permian production further to the northwest.

Republic Natural Gas Company and Seaboard Oil Company of Delaware White Ranch 1 in 34-11s-29e first drew considerable attention potentialing for 294 barrels of oil per day from the Siluro-Devonian at total depth of 8775 feet, plugged back to 8771 feet.

In August, 1953, a direct south offset, the same operators' White Ranch 2, was completed for a daily flowing rate of 2598 barrels of oil at total depth 8810 feet from the Siluro-Devonian.

The northeastern portion of the county was the site for the second important discovery, Forest Oil Corporation General American-Federal 1, 7-7s-31e, wildcat producer gauging 1023 barrels of oil per day on its potential test from the Pennsylvanian at total depth 9298 feet, plugged back to 8465 feet.

The West Tulk Area gained a new producer with the completion of Neville G. Penrose, Inc. Stella Zimmerman 1 in 15-14s-31e, for a daily rate of 34 barrels of oil on pump, bottomed at 4139 feet, plugged back to 2900 feet in Queen Sand.

**Eddy County.** Eddy County was the scene of the deepest drilling in the state, with three wildcats already surpassing the 15,000-foot depth, and another slated for that depth.

The two most important discoveries in the county for the past 12 months were the Richardson & Bass Cobb-Federal 1, 23-20s-31e, completed in sand in the Delaware Mountain Group at plug back depth 7173 feet from a record 16,459-foot total depth for a daily pumping rate of 215 barrels of oil, and Stanolind Oil & Gas Company State "AB" 1, 29-20s-24e, completed in the Pennsylvanian for a daily gas flow of 30,000,000 cubic feet at total depth 12,431 feet, plugged back to 10,270 feet.

NORTH BLACK RIVER AREA. A shallow 1881-foot Delaware Sand discovery was completed in this area, Hanson and Yates Cordie King 1 in 22-23s-26e, pumping 58 barrels of oil per day.

CEDAR HILLS AREA. R. S. MacGruder opened production in the area with the completion of his State 1, 15-21s-27e, wildcat discovery pumping 10 barrels of oil per day at plug back depth 558 feet in the Yates from total depth 561 feet.

Buck Jones Drilling Company V. L. Gates 1, 29-26s-27e, was another shallow pumping discovery at total depth 885 feet in the Castile, making 20 barrels of oil per day on its potential test.

**Lea County.** As in the past, Lea County continued to dominate the overall picture of development in New Mexico, having a total of 25 new discoveries opening 13 pools, the most important of which were the wells projected to the deeper Pre-Permian pay.

ANDERSON RANCH AREA. Probably the most important of the newly opened areas in the state, this one already has discoveries from the Wolfcamp and the Devonian and has four active projects, one of which has shown for possible production from the Pennsylvanian.

Continental Oil Company Anderson Ranch Unit 1, 11-16s-32e, opened Devonian production at total depth 13,775 feet, plugged back to 13,508 feet, flowing 1468 barrels of oil per day. This is the well which blew out, caught fire, and burned, causing considerable delay and expense before operator could complete.

The firm's Anderson Ranch Unit 4, 11-16s-32e, direct north offset to the discovery well, opened Wolfcamp production in the area at plug back depth 9866 feet from total depth 9914 feet, making 1758 barrels of oil per day on potential tests.

BRONCO AREA. This area was actually opened by Amerada Petroleum

*for that big one off shore*

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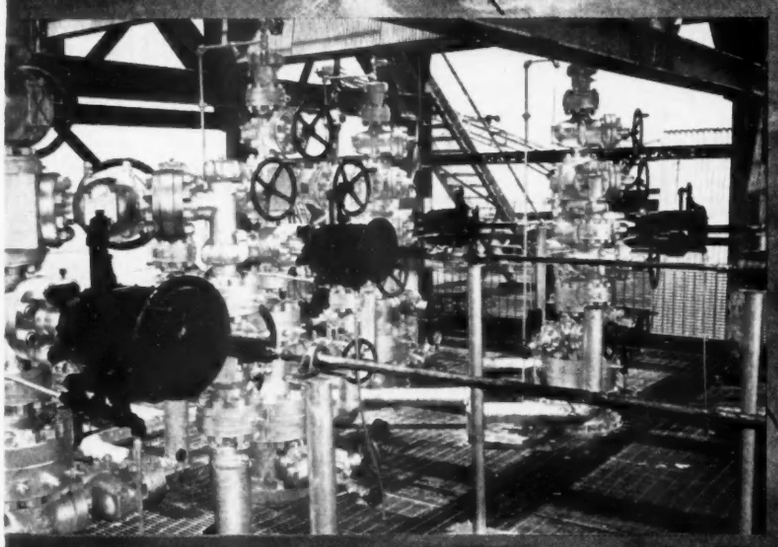

**It's just like fishing with a heavy test line when you install E-I-M Valve Controls. You can be sure that the well won't get away from you because E-I-M has a record of safety and dependability. Our engineers can solve your transmission problems with E-I-M Valve Controls for oil or gas lines off shore or across the continent.**

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Company 1 Weems, Devonian discovery just across the State-line in Yoakum County, Texas. First production in the Bronco Siluro-Devonian field on the New Mexico side was the firm's Schenck 1, 14-13s-38e, Siluro-Devonian producer at total depth 12,548 feet, plugged back to 11,940 feet. It flowed 560 barrels of oil per day. This producer drilled ahead to Ellenburger and established granite before plugging back.

A confirmation test of this area was the same operator's L. W. Ward 1, 11-13s-38e, bottomed at 11,890 feet and gauging 1597.6 barrels of oil per day.

EAST HARE AREA. The opening of this area swung some attention to the southeastern portion of the county, Southern Union Gas Company completing its Parcell-Federal 1, 19-21s-38e, for a daily rate of 288 barrels of oil from the Abo at total depth 9208 feet, plugged back to 7550 feet.

CAPROCK AREA. A total of seven wells were completed in this general area including both the East Caprock and Northeast Caprock from three pay zones, Devonian, Bend and Wolfcamp.

The lone Devonian producer was Amerada Petroleum Company Allie M. Lee 1, 23-11s-32e, in the Northeast Caprock area. Bottomed at 10,695 feet, but plugged back to 10,681 feet, it made 269 barrels of oil per day on potential.

In the same area, The Texas Company drilled three Bend producers, the State "BA" 1, 14-12s-32e, flowed 949 barrels of oil per day at total depth 10,600 feet, plug back 10,480 feet; the State "BP" 1, 26-11s-32e, flowed 24 barrels of oil per day at total depth 10,041 feet, plug back 10,040 feet; and the State "BJ" 1, 22-10s-32e, flowing 156 barrels of distillate, 2,510,000 cubic feet of gas per day at total depth 10,807 feet, plug back to 9890 feet.

The three Wolfcamp producers of the area were Jake L. Hamon Litt Chambers 1, and Skelly Oil Company State 1-5, of the East Caprock Area, and Magnolia Petroleum Company State "D" 1, discovery in the Northeast Caprock area. All were flowing oil wells, rating 198, 533 and 605 barrels per day, respectively.

DENTON AREA. This area in the northeastern portion of the county gained a new discovery from the Devonian with the completion of Sinclair Oil & Gas Company Lee Whitman 1, 26-14s-37e, for a daily flowing rate of 2568 barrels of oil per day at total depth 12,575 feet, plug back at 8975 feet.

TEAGUE AREA. The McKee sand was opened for production in this area at total depth 9290 feet by Amon Carter Hill-Federal 1, 34-23s-37e, flowing 1104 barrels of oil per day.

SANDERS AREA. Gulf Oil Corporation State "AN" 1, 27-13s-33e, wildcat discovery opened this area from the Pennsylvanian, gauging 998 barrels of oil per day on its potential test. It drilled to total depth 13,440 feet.

CASS AREA. The lone discovery for this area during the past 12 months, was Morris E. Antweill Phillip-Hooper 1, 27-20s-37, wildcat gas discovery of the Quen Sand at plug back depth 3677 feet from total depth 5828 feet. It produced on its potential test 4,507,000 cubic feet of gas per day.

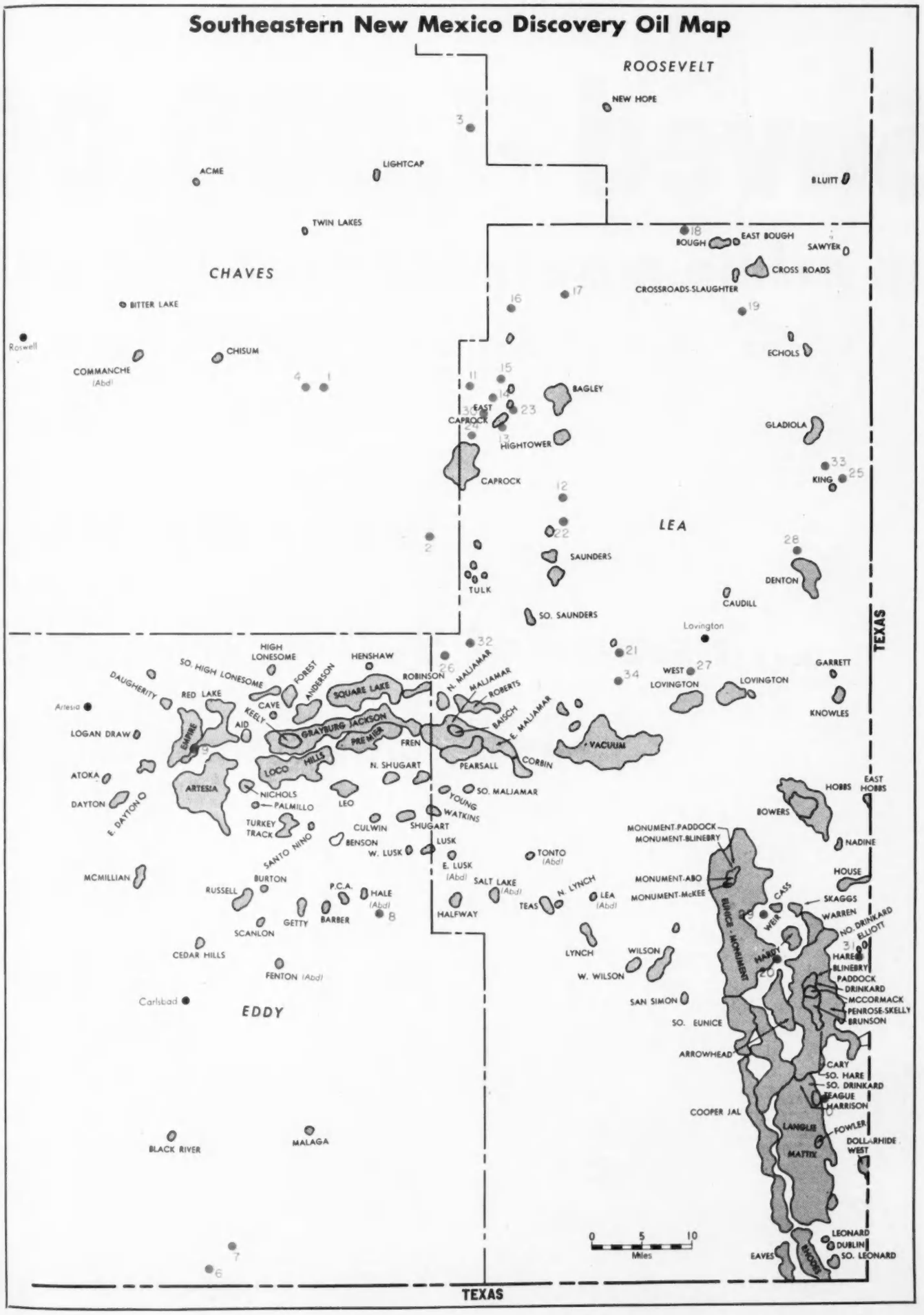
MESCALERO AREA. Cities Service Oil Company completed its State

**Green on map on opposite page shows discoveries made during past 12 months (Sept. 1, 1952 through Aug. 31, 1953).**

**TABLE 1**
**Summary of Oil and Gas Discoveries in Southeastern New Mexico, Sept. 1, 1952-Aug. 31, 1953**

| Map No. | S. T. R. | Company | Lease | Potential | Total Depth | Producing Formation |
|---|---|---|---|---|---|---|
| | | | **Chaves County** | | | |
| 1 | 34-11s-29e | Republic Nat. Gas & Seaboard Oil Co. | White Ranch No. 1 | F. 294 BOPD | TD 8775 PB 8771 | Siluro-Devonian |
| 2 | 15-14s-31e | Neville G. Penrose | Stella Zimmerman No. 1 | P. 34 BOPD | TD 4139 PB 2900 | Queen Sand |
| 3 | 7-7s-31e | Forest Oil Corp. | General-American Federal No. 1 | F. 1023 BOPD | TD 9298 PB 8465 | Pennsylvanian |
| 4 | 34-11s-29e | Republic Nat. Gas & Seaboard Oil Co. | White Ranch No. 2 | F. 2598 BOPD | TD 8810 | Siluro-Devonian |
| | | | **Eddy County** | | | |
| 5 | 22-23s-26e | Hanson & Yates | Cordie King No. 1 | P. 58 BOPD | TD 1881 | Delaware Sand |
| 6 | 29-26s-27e | Buck Jones Drlg. Co. | V. L. Gates No. 1 | P. 20 BOPD | TD 885 | Castile |
| 7 | 15-21s-27e | R. S. Macgruder | State No. 1 | P. 10 BOPD | TD 561 | Yates |
| 8 | 23-20s-31e | Richardson & Bass | Geo. H. Cobb-Federal No. 1 | P. 215 BOPD | TD 16459 PB 7173 | San in Delaware Mountain Group |
| 9 | 29-17s-28e | Stanolind Oil & Gas Company | State "AB" No. 1 | F. 30,000,000 CFGPD | TD 12431 PB 10270 | Pennsylvanian |
| | | | **Lea County** | | | |
| 10 | 34-23s-37e | Amon Carter | Hilt-Federal No. 1-M | F. 1104 BOPD | TD 9290 | McKee |
| 11 | 23-11s-32e | Amerada Petr. Co. | Allie M. Lee No. 1 | F. 269 BOPD | TD 10695 PB 10681 | Devonian |
| 12 | 27-13s-33e | Gulf Oil Corp. | State "AN" No. 1 | F. 998 BOPD | TD 13440 | Pennsylvanian |
| 13 | 14-12s-32e | The Texas Co. | State "BA" No. 1 | F. 949 BOPD | TD 10600 PB 10480 | Bend |
| 14 | 26-11s-32e | The Texas Co. | State "BP" No. 1 | F. 24 BOPD | TD 10041 PB 10040 | Bend |
| 15 | 26-11s-32e | The Texas Co. | State "BJ" No. 1 | F. 156 BOPD 2,510MCFPD | TD 10807 PB 9890 | Bend |
| 16 | 22-10s-32e | Cities Service Prod. Company | State "AD" No. 1 | F. 2174 BOPD | TD 9916 PB 9913 | Devonian |
| 17 | 10-13s-33e | Lawton Oil Co. | State-Gulf No. 2 | F. 1320 MCFPD 112 B Condensate | TD 13080 PB 11469 | Pennsylvanian |
| 18 | 16- 9s-35e | Lone Star Prod. Company et al | State-King No. 1 | F. 2450 MCFGPD | TD 10015 PB 4820 | San Andres |
| 19 | 23-16s-36e | Shell Oil Co. | State "CA" No. 1 | F. 504 BOPD | TD 12751 PB 11250 | Wolfcamp |
| 20 | 13-21s-36e | Tidewater Associated Oil Co. | Marshall No. 1 (OWWO) | F. 1100 MCFPD | TD 7087 PB 3952 | San Andres |
| 21 | 18-16s-35e | Skelly Oil Co. | State "R" No. 1 | F. 1302 BOPD | TD 10765 PB 10734 | Pennsylvanian |
| 22 | 2-14s-33e | The Texas Co. | State "BQ" No. 1 | P. 50 BOPD | TD 10080 PB 10022 | Pennsylvanian |
| 23 | 1-12s-32e | Jake L. Hamon | Litt Chambers No. 1 | F. 198 BOPD | TD 11384 PB 8594 | Wolfcamp |
| 24 | 23-12s-32e | Skelly Oil Co. | State No. 1-s | F. 533 BOPD | TD 8696 PB 8670 | Wolfcamp |
| 25 | 14-13s-38e | Amerada Petr. Corp. | H. D. Schenck No. 1 | F. 560 BOPD | TD 12548 PB 11940 | Siluro-Devonian |
| 26 | 11-16s-32e | Continental Oil Co. | Anderson Ranch Unit No. 1 | F. 1468 BOPD | TD 13775 PB 13508 | Devonian |
| 27 | 30-16s-36e | Lawton Oil Co. | State "L" No. 1 | F. 168 BOPD | TD 11984 PB 11464 | Pennsylvanian |
| 28 | 26-14s-37e | Sinclair Oil & Gas Company | Lee Whitman No. 1 | F. 2568 BOPD | TD 12575 PB 12489 | Devonian |
| 29 | 27-20s-37e | Morris E. Antweil | Phillip-Hooper No. 1 | F. 4507 MCFPD | TD 5828 PB 3677 | Queen Sand |
| 30 | 23-12s-32e | Magnolia Petr. Co. | State "D" No. 1 | F. 605 BOPD | TD 9029 PB 8975 | Wolfcamp |
| 31 | 19-21s-38e | Southern Union Gas. Co. | Parcell-Federal No. 1 | F. 288 BOPD | TD 9208 PB 7550 | abo |
| 32 | 11-16s-32e | Continental Oil Co. | Anderson-Ranch Unit No. 4 | F. 1758 BOPD | TD 9914 PB 9866 | Wolfcamp |
| 33 | 11-13s-38e | Amerada Petr. Corp. | L. W. Ward No. 1 | F. 1597.6 BOPD | TD 11890 | Devonian |
| 34 | 35-16s-35e | Western Natural Gas Company | Millard Eidson No. 1* | F. 66 BO/3 hrs. | | |

* This well has indicated Devonian production as a discovery well on a drill stem test from 12,489-520 feet, but has not completed.


Southeastern New Mexico Discovery Oil Map
ROOSEVELT
NEW HOPE
LIGHTCAP
ACME
BLUITT
TWIN LAKES
BOUGH
EAST BOUGH
SAWYER
CHAVES
CROSS ROADS
CROSSROADS-SLAUGHTER
BITTER LAKE
Roswell
CHISUM
COMMANCHE (Abd)
ECHOLS
BAGLEY
EAST CAPROCK
HIGHTOWER
GLADIOLA
CAPROCK
KING
LEA
SAUNDERS
TULK
DENTON
CAUDILL
SO. SAUNDERS
Lovington
TEXAS
HIGH LONESOME
HENSHAW
SO. HIGH LONESOME
FOREST
ANDERSON
ROBINSON
N. MALJAMAR
ROBERTS
SQUARE LAKE
DAUGHERTY
RED LAKE
CAVE
KEELY
AID
GRAYBURG JACKSON
PREMIER
FREN
BAISCH
E. MALJAMAR
VACUUM
PEARSALL
CORBIN
WEST LOVINGTON
LOVINGTON
GARRETT
KNOWLES
Artesia
LOGAN DRAW
EMPIRE
ATOKA
DAYTON
E. DAYTON
LOCO HILLS
ARTESIA
NICHOLS
PALMILLO
N. SHUGART
SO. MALJAMAR
YOUNG
WATKINS
LEO
HOBBS
EAST HOBBS
BOWERS
NADINE
TURKEY TRACK
CULWIN
SHUGART
SANTO NINO
BENSON
W. LUSK
LUSK
E. LUSK (Abd)
TONTO (Abd)
MONUMENT-PADDOCK
MONUMENT-BLINEBRY
MONUMENT-ABO
MONUMENT-McKEE
HOUSE
SKAGGS
WARREN
NO. DRINKARD
ELLIOTT
MCMILLIAN
BURTON
RUSSELL
P.C.A.
HALE (Abd)
SALT LAKE (Abd)
N. LYNCH
LEA (Abd)
TEAS
HALFWAY
CASS
WEIR
BLINEBRY-MONUMENT
HARE
BLINEBRY
PADDOCK
DRINKARD
MCCORMACK
PENROSE-SKELLY
BRUNSON
GETTY
BARBER
SCANLON
CEDAR HILLS
FENTON (Abd)
LYNCH
WILSON
W. WILSON
SAN SIMON
SO. EUNICE
ARROWHEAD
CARY
SO. HARE
SO. DRINKARD
TEAGUE
HARRISON
COOPER JAL
LANGLIE MATTIX
FOWLER
DOLLARHIDE WEST
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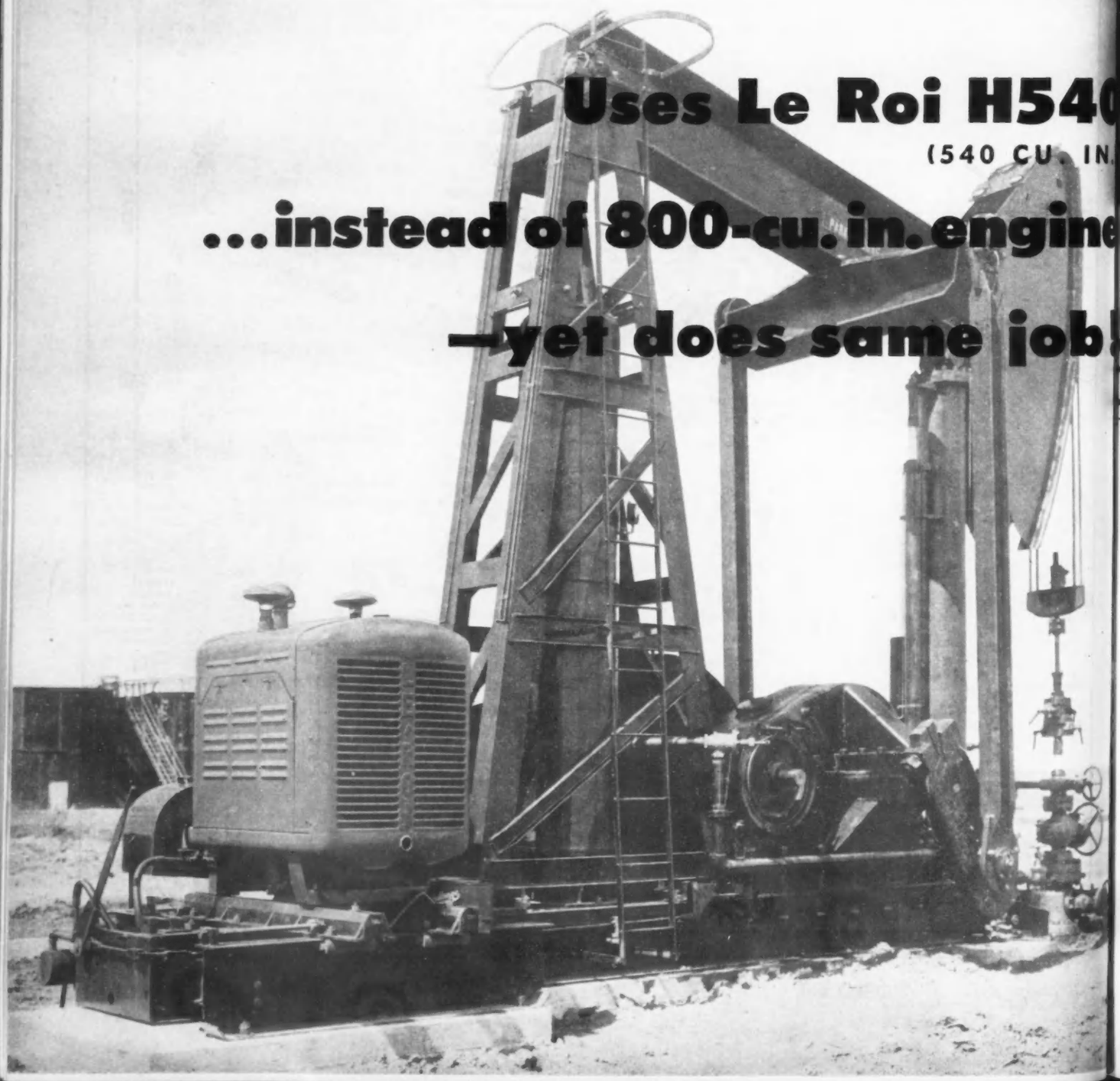

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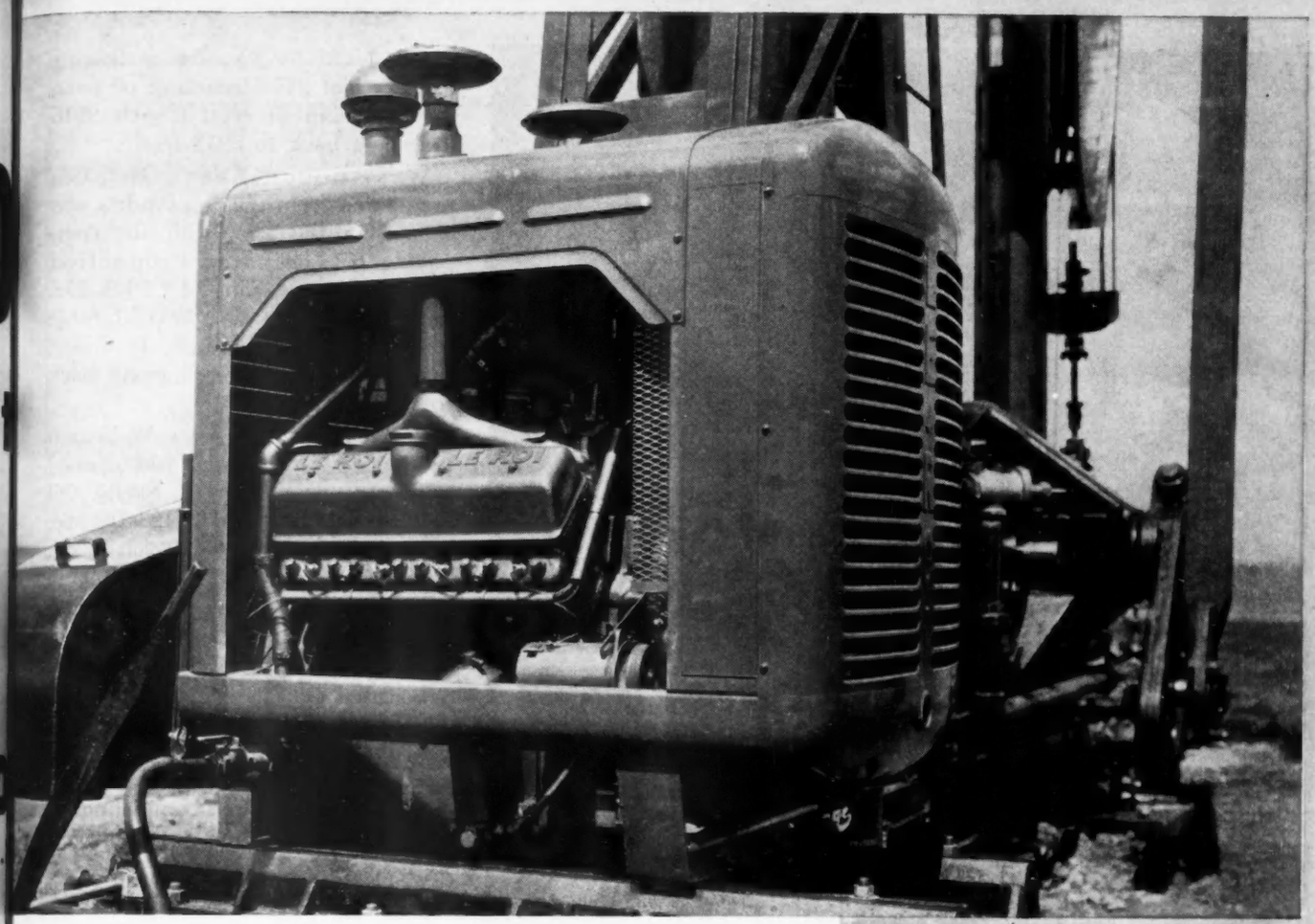

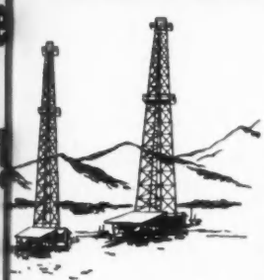

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They installed a Parkersburg Air-Balanced Pumper on an 8,000-foot well, to pump about 100 barrels of liquid per day. This Parkersburg is a 460,000-inch pound-unit with about a 19,000-lb. rod load and 120-inch stroke.

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**Kansas**
Carson Machine and Supply Co.—Great Bend

**Illinois — Western Kentucky**
Western Machinery & Engine Company — Centralia, Illinois and St. Louis, Missouri.

**Michigan**
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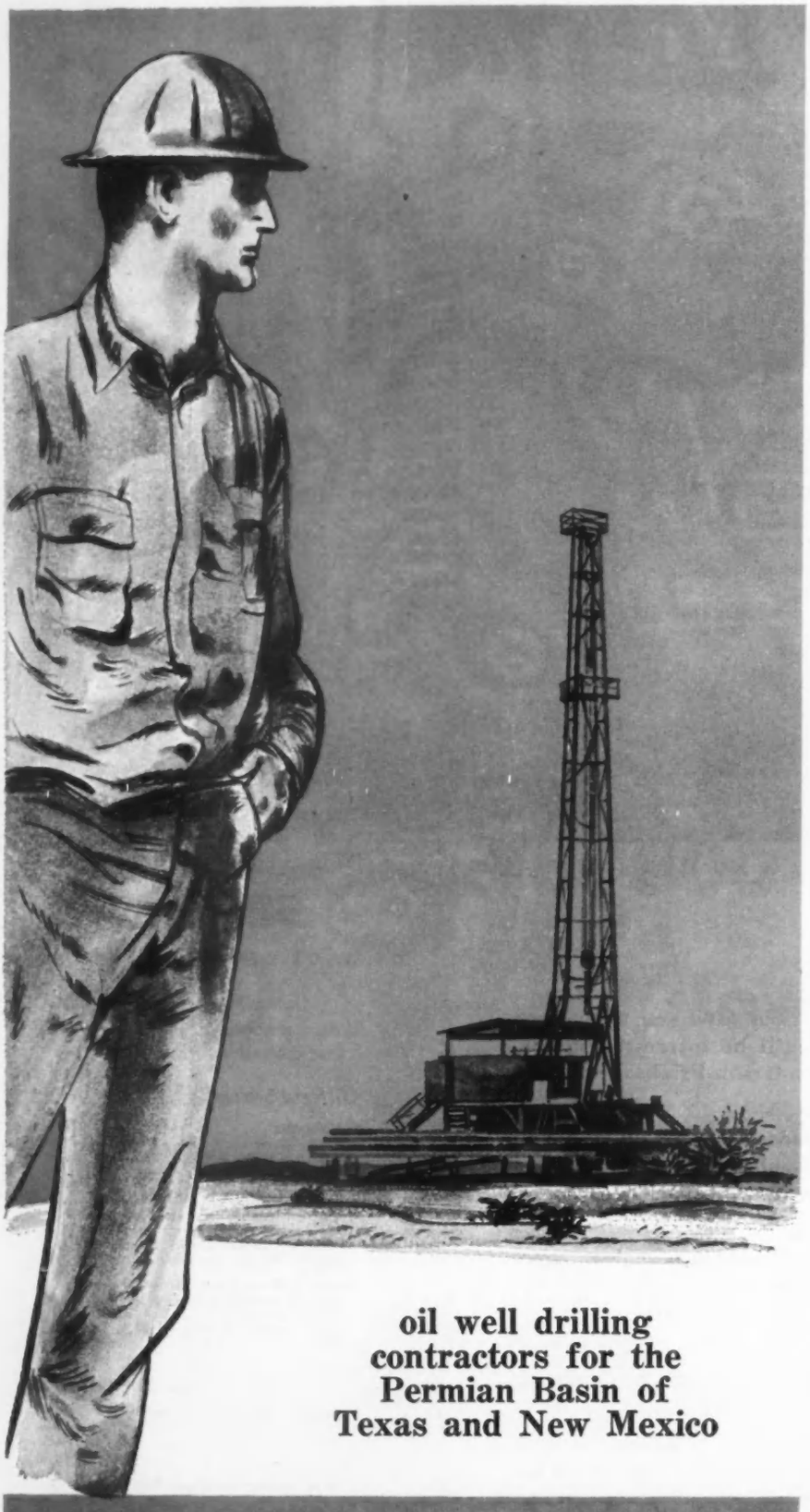
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"AD" 1, 22-10s-32e, for a flowing daily rate of 2174 barrels of oil from the Devonian at total depth 9916 feet, plug back to 9913 feet.

WEST BOUGH AREA (Gas). Gas production from the San Andres was opened in the area with the completing of Lone Star Production Company State-King 1, 16-9s-35e, for a daily flow of 2,450,000 cubic feet of gas per day rate. It drilled to 10,015 feet before plugging back to 4820 feet.

N. W. LOVINGTON AREA. Wolfcamp production of the area was opened with the completing of Skelly Oil Company State "CA" 1, 23-16s-36e, for a daily flow of 504 barrels of oil. It plugged back to 11,250 feet to complete after drilling to total depth 12,751 feet.

EUNICE-MONUMENT. Tide Water Associated Oil Company Marshall 1, 18-16s-35e, wildcat discovery of the San Andres in this area, drilled to total depth 7087 before plugging back to 3952 feet and completing for a daily flow of 1,100,000 cubic feet of gas.

SOUTHWEST TOWNSEND AREA. The Pennsylvanian was opened commercially in this area when Skelly Oil Company completed its State "R" 1, 18-16s-35e, for a daily flowing rate of 1302 barrels of oil from plug back depth of 10,734 feet, total depth 10,765 feet.

**Production Figures.** The total amount of oil produced for the four-county area in Southeastern New Mexico for the fiscal year 1952 was 58,467,268 barrels.

The amount of casinghead gas produced over the same area during the same length of time was 192,490,865 Mcf (per year).

Broken down into counties, Lea County produced 54,428,416 barrels of oil, ran 54,189,633 barrels of oil and produced 187,751,813 cubic feet of casinghead gas.

Eddy County was second with 3,853,576 barrels of oil produced, 3,853,958 barrels run and 4,589,294 cubic feet of gas produced.

Chaves County produced 181,028 barrels of oil, ran 181,812 barrels of oil and produced 149,758 cubic feet of gas.

Roosevelt produced 4248 barrels of oil, ran 4023 barrels of oil and produced no gas. **—The End**

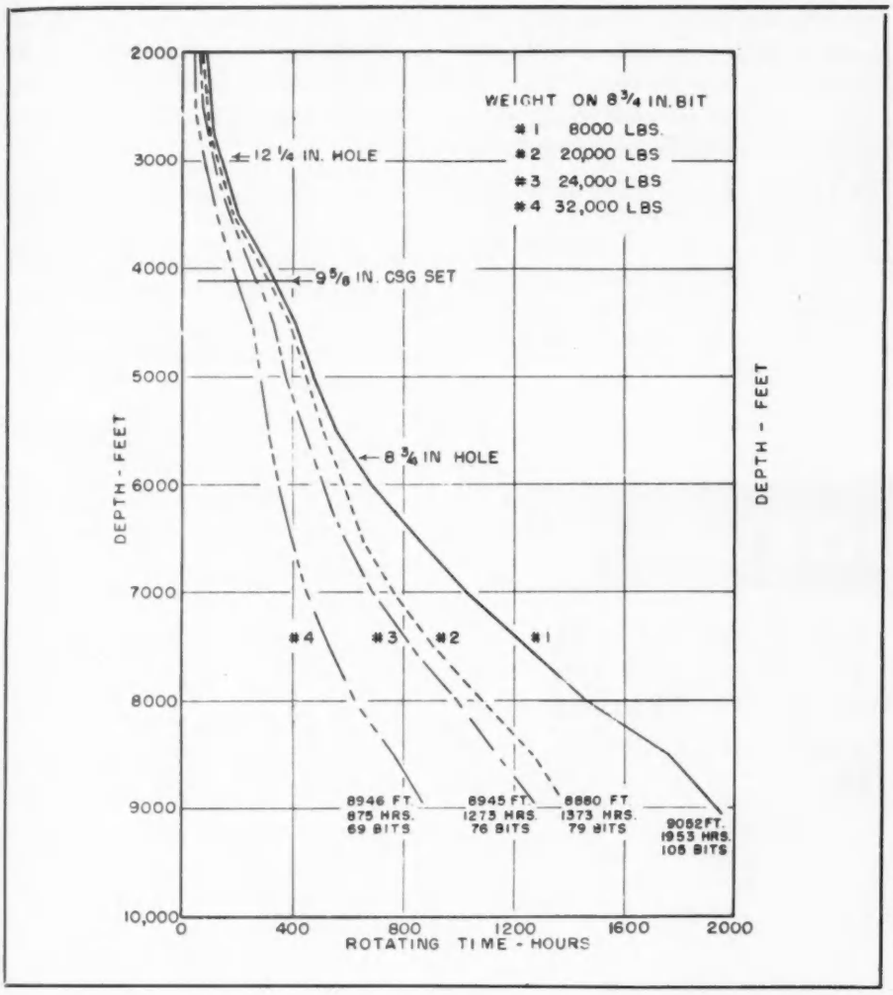


FIGURE 1.

# Completion Time Cut By Drilling Progress

**• Gains in Permian Basin area in past five years are almost incredible.**

**• Here's a review of the advancements and a look at what the future holds.**

**By A. W. THOMPSON,** President, Thompson-Carr, Inc., Houston

DRILLING PROGRESS during the past five years has substantially reduced the time required to complete Permian Basin wells. The advancement is almost incredible, considering all the difficulties and complexities encountered in the area.

Much has been accomplished in overcoming thick chert sections, lost circulation, crooked holes, and blow-

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out conditions. A spirit of cooperation between oil companies, equipment manufacturers, service companies, and drilling contractors has had much to do with the progress. Faster penetration rates have kept West Texas rotary contractors in business in the face of keener competition and deteriorating economic conditions, increased the usefulness of contractors to oil producing companies, and done much to permit the development of oil reserves of West Texas and Southeastern New Mexico.

Improvements in drilling during the past five years has been the result of:

- The use of long heavy drill collar strings.
- The use of chert bits and jet bits, along with concerted studies on rates of penetration, rotary speeds and weights.
- Mud programs, such as deeper drilling with clear water, and lightweight muds for lost circulation, etc.
- Better crew training.

Future improvements in drilling techniques hold the key to the contractor's effort to drill deeper with less hole troubles at reduced rates. Prospects for improvements in future drilling practices depend heavily on the following phases:

- Improvements by bit companies through continued research on bits, especially to obtain better bearings. Studies on rocks and their behavior under various pressures.
- Development of better designed and lighter equipment. Lightweight drill pipe will be desirable.
- Development by contractors of better training and safety programs to increase the efficiency of the manpower on rigs.
- An industry-wide movement for better cooperation between contractors, service companies and operators. This has the best possibilities of all.
- A more liberal concept of straight hole clauses in contracts.

**Weight on Bit.** Prior to the use of long strings of drill collars, it was not uncommon for operators to require 193 days and 162 bits to drill an Ellenburger well. Long strings of drill collars have reduced this time in many instances by 40 to 50 percent. At the same time the bit consumption has been reduced 25 to 45 percent.

This trend developed during the latter part of 1946 and 1947 and was followed by continued improvement until approximately 1949. Since that time there has been a leveling off of bit consumption. The years following 1949 have shown a small bit advantage, probably not over a maximum consumption reduction of 5 percent, while the days to drill the well have been reduced an additional 16 to 17

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percent. In 1947, David Johnston[1] presented evidence to show the effect of gradual increases of bit weight on penetration rates in Andrews County (Figure 1). Each increase in weight resulted in a decrease in rotating hours to drill the well, and increased the footage per bit in most cases.

Experience has shown it is not always good economy to get the maximum footage out of a bit. The practice of changing bits before drilling time slows down too drastically has been instrumental in drilling some very fast wells.

From 1946 to 1949 contractors were learning to handle long drill collar strings, but in 1950 any indication of the trend was almost wrecked by most unusual instances due to the Korean War. The use of long drill collars cost the contractors a large sum in additional investment and maintenance costs. More experience has reduced the maintenance cost considerably during the past two or three years. A string of large drill collars cost approximately $20,000 to $25,000 per rig. Some contractors operating in West Texas maintain investments up to $500,000 in drill collars alone. The average contractor's investment in drill collars is from $150,000 to $250,000. Rapid depreciation of the drill stem because of corrosion and corrosion fatigue is greater in West Texas than any other area.

**Chert Bits.** In the past few years development of better drilling bits has been of considerable importance to West Texas drilling. When chert bits were being developed in 1949, some tests showed a reduction of 25 percent in bit consumption for chert sections with little corresponding decrease in over-all time.

Chert bits have an economic point, above which their use is not justified. This point is naturally dependent upon depth of formations and rig operating costs. At this time, chert bits have 3 or 5-to-1 advantage over conventional bits in many formations. In some instances advantages of 17 to 1 have been noted; however, these are not common. These bits reflect upon the bit consumption only to the extent that they are used. Little advantage is noted in "on bottom drilling time" for the entire well. The development of bits using compressed carbide inserts has done much to reduce the hard formation drilling problems in West Texas.

**Jet Bits.** Jet bits thus far have shown little effect on the over-all West Texas picture other than in certain well controlled tests. The bit consumption through the use of jets has decreased by as much as 25 percent, with little corresponding decrease in over-all time. While jet bits have not been completely proven for West Texas, more of them currently are being used there than at any other time. However, cleaner holes and longer bit life have resulted in fewer trips. Many West Texas contractors are using mud pumps too small to furnish enough fluid to give sufficient nozzle velocity for satisfactory jet performance. After certain modifications of equipment are made, the perform-

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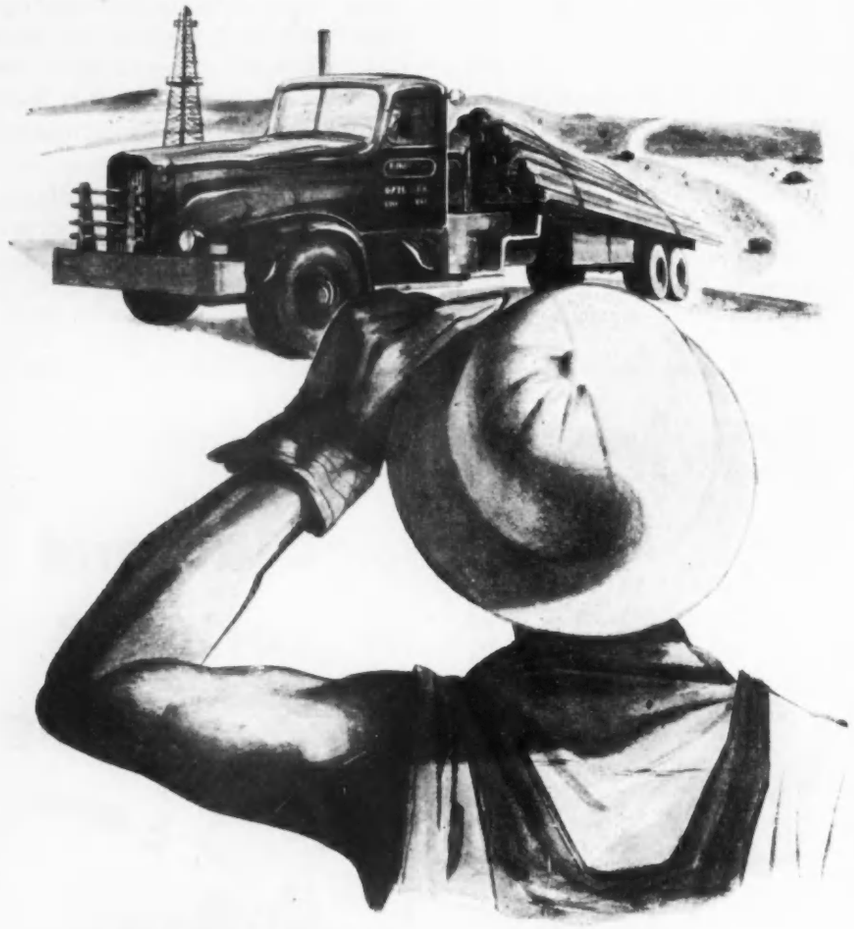

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ance of jet bits may be improved, including faster penetration rates.

**Mud Program.** The improvement of penetration rates resulting from the mud program has been outstanding. Beginning in 1951 to the present date, studies have been made on drilling rates in which clear water has been used to drill as deep as possible. Notable increases have been made in the last two years as a result.

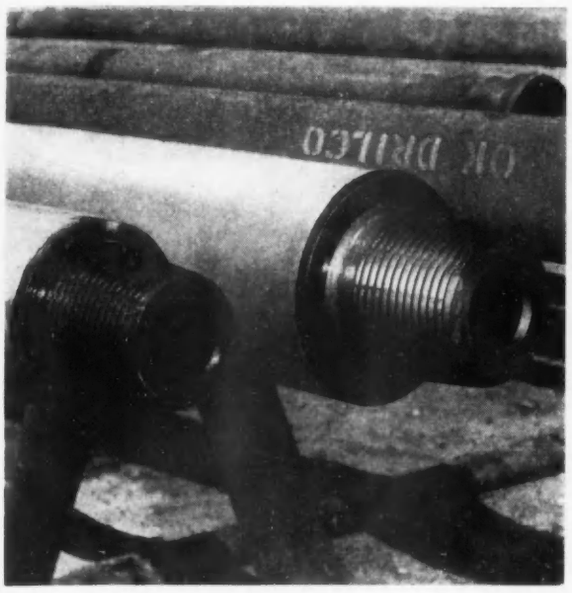
In the Spraberry and many other areas of West Texas, fresh water is used to drill out below salt strings and the weight is maintained at approximately 8.3 pounds per gallon by the addition of crude oil.

Much is to be said about the use of emulsion muds. Emulsions are very valuable drilling tools, but are not widely used because geologists are not able to differentiate whether fluorescence in the samples or cuttings is due to nature or use of emulsion muds. Many major companies are giving a lot of attention to this problem. It is to be hoped that studies will overcome this problem. Contractors are fully aware of the geologist's problems and realize that drilling a hole in the ground is not the final objective in exploring for oil.

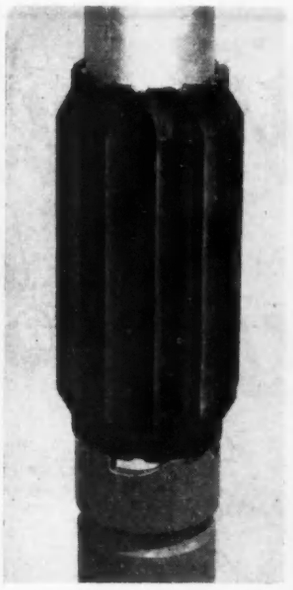
**Training of Crews.** The training of drilling contractor's crews and better supervision of these crews has been another step that has paid big dividends. Regardless of the equipment, the men that operate the equipment are the ones who get the results. Proper maintenance and safety practices will pay dividends to any drilling contractor.

**West Texas Contract Prices.** The West Texas drilling contractor has been plagued with the rising cost and low revenue rates. Deeper drilling has contributed to the contractor's cost. Only faster penetration rates, resulting from the improved drilling techniques, have enabled the drilling contractor to offset the downward trend of footage prices.

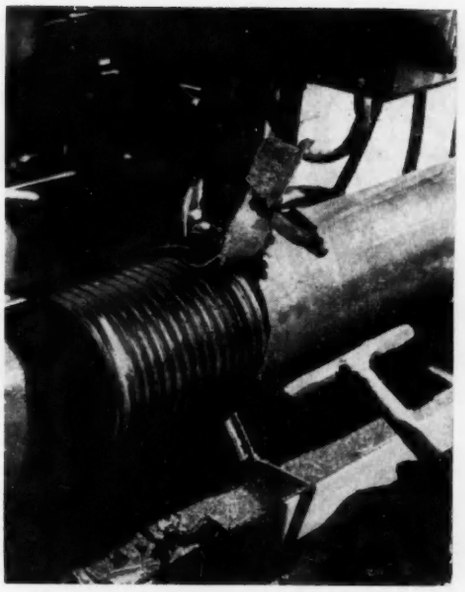
The cost to complete a well has risen in a geometrical progression. A recent study by one major company shows a steady increase in West



Drilco uses the most advanced equipment for cold working thread roots to manufacturer's specifications. Modification of joints by "relief grooves" to reduce stress concentrations is a Drilco specialty.



The rubber sleeve-type drill string stabilizer is the result of years of development by the Drilco organization. These tools are proving effective in stabilizing the drill collar string, helps drill faster, make straighter hole.



Automatic submerged arc hard-facing of drill collars and tool joints resists much abrasive wear. The material is tungsten carbide. This service was developed by Process Engineering Co. of Ft. Worth. Drilco is Permian Basin licensee.

Systematic inspection of drill collars was introduced to the Permian Basin in 1949 by Drill Collar Service Co., a predecessor of Drilco Oil Tools. This service has become so well developed it eliminates trucking of many joints to shops for service.

# ENGINEERED TECHNIQUES AND TOOLS OF REAL SERVICE TO WEST TEXAS DRILLING CONTRACTORS

## Here are important services and equipment helping to improve drilling operations in the Permian Basin.

A little more than 5 years ago, two young engineers from one of the major oil tool manufacturers originated a systematic "on-the-rig-maintenance" drill collar service in West Texas to reduce fishing and maintenance costs. Since then their organization has grown in size from two employees to 50. It provides a wide list of engineered services and tools for the oil industry. Such growth has resulted because the entire organization has worked to improve current services and develop new and better techniques and tools.

The first service to be improved was the original "on-the-rig" maintenance of drill collars. It was found that many cracks located by inspection were minor and could be safely removed by grinding. Shoulders and threads with only minor damage could be repaired at the location with hand tools. Bevels could be re-ground to protect flat shoulders and facilitate location of joints by crews while making trips. Thus, fishing jobs were prevented and the life of joints extended. It is not uncommon today to find drilling contractors who have operated all their rigs for years without a single drill collar failure in the hole. They say this was achieved with a lower maintenance cost.

About this same time, it was noted that the principal cause of the most common drill collar failure was incorrect make-up torque. The Drilco Torquemaster was developed to meet this need. This tool makes it simple and convenient for the driller to tighten drill collars correctly. Many instances are recorded where 4 or 5 pin failures per well have been reduced to none over periods of many wells.

In 1950 the new organization started work on the modification of drill collar joint designs to reduce stress concentrations. In fact, drill collar boxes from one particular lot have operated since June, 1950, with only one fatigue crack reported, which could itself be attributed to excessive O.D. wear.

In 1951 they began work on the problem of drill string stabilization. Evidence showed that stabilization of the lower end of the string not only helped maintain a vertical hole, but also permitted use of greater drilling weights through elimination of buckling immediately above the bit. Much progress has been made on utilization of cast iron, ductile iron and rubber-type sleeves or bushings for stabilization.

A major expansion was made in March, 1953, when the Snyder and Midland machine shops of Morris and Blount Tool Co. were added, and the entire operation consolidated into Drilco Oil Tools. The consolidation included personnel as well as equipment to provide a complete general oil country welding and repair service. At the same time, services were expanded to include tungsten carbide hard facing.

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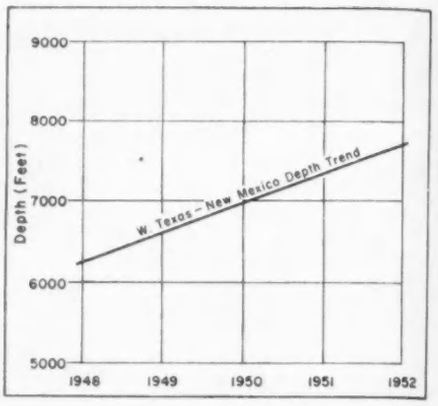


FIGURE 2

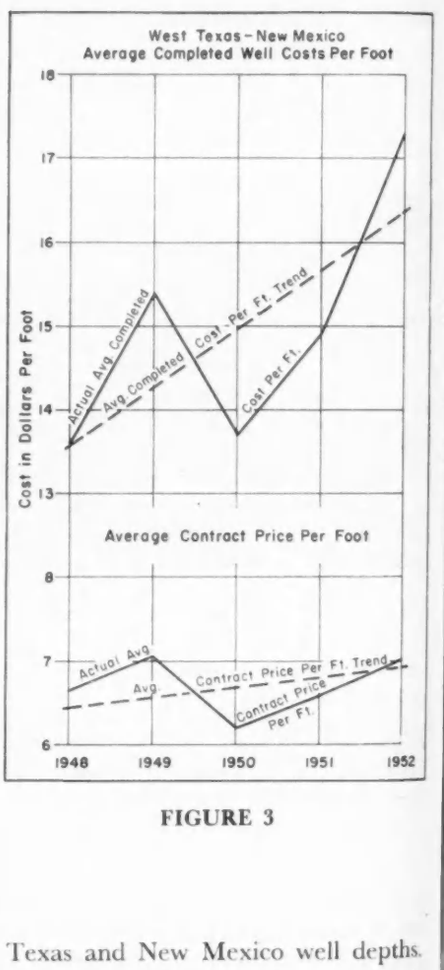


FIGURE 3

Texas and New Mexico well depths. It is indicated that this company's West Texas-Southeast New Mexico wells will soon average in excess of 8000 feet in depth (Figure 2). This deeper drilling is contributing a lion's share to sharp increases in completion costs. Figure 3, showing this same company's average completed well cost per foot for West Texas and New Mexico, indicates that contractor's 1952 prices per foot were

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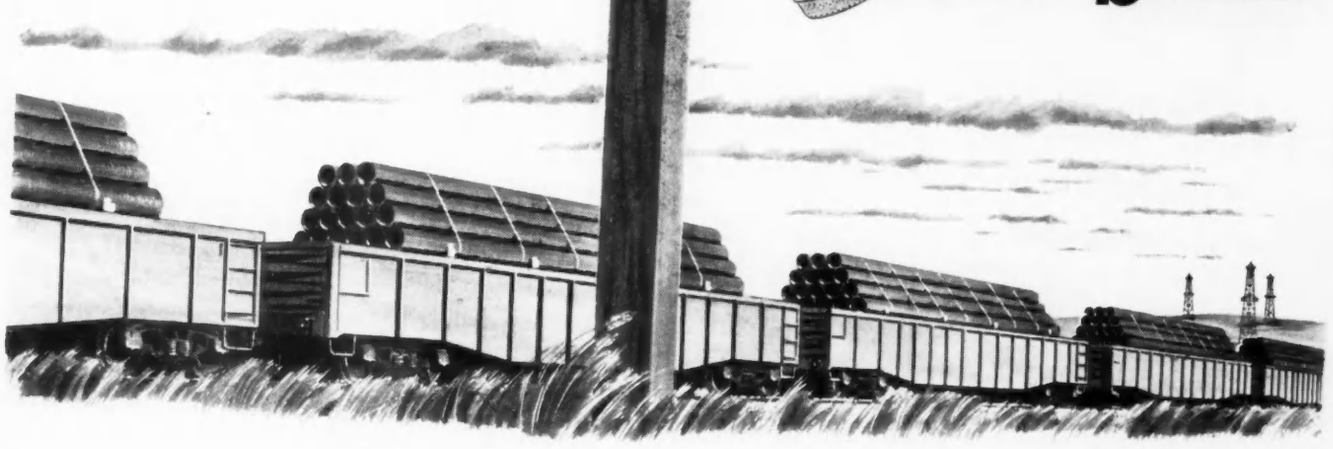

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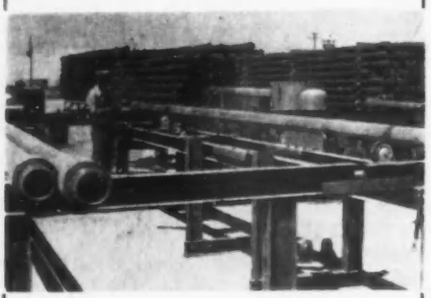

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cheaper than in 1949. In spite of this the average cost to complete has increased quite sharply.

**Future Study.** While much has been accomplished, additional future study is needed to solve the problems of lost circulation, crooked hole and increase the efficiency of the circulating system and further increase penetration rates. Through improved methods and tools, and better planning of drilling programs, drilling costs can be reduced without hurting the contractor, equipment manufacturer or service company.

- Studies are now being made on drilling bits in order to improve the bearings of the bits. Some bits now are failing because the bearings wear out before the bits do. Further studies are being made by the bit companies on rocks and their behavior under pressures as they affect the rates of penetration.

- Equipment manufacturers need to design lighter equipment. Many contractors believe equipment is too heavy and causes excessive transportation charges.

- Company engineers are giving a great deal of thought and are making studies of a more practical deviation clause in drilling contracts than has been used.

- The crooked hole problem is being helped by the use of stabilizers and by large outside diameter drill collars. Both create additional drilling hazards, but theoretical studies by Lubinski and Woods[3] show that this is a necessity and at present is the only help to correct this problem. Therefore, the contractor must accept these hazards, in absence of anything better.

- It will be necessary for the drilling contractors to develop training programs similar to other industries in order to increase the efficiency of their manpower pool. The drilling industry will need more engineers who are


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willing to go into the field and train on drilling rigs.

- In order to further reduce drilling time, more cooperation is necessary between contractors, operators, and service companies. This has possibilities that are currently being overlooked. If more attention were paid to this item, it would result in greater reduction in drilling costs.

- A great deal of concern has been felt as to the cost of drilling of wildcat wells. Substantial reductions might be achieved if the contractor and members of the geologic division of the companies concerned would sit down and plan the drilling program in advance of the drilling.

Frequently orders are given to core, and considerable time is taken to condition the hole. If the contractor knows coring is expected at a certain point (sub sea datum), hole conditioning can be done while drilling progresses at a very little loss in time. Many other instances can be cited.

Logs of the nearest well showing formations encountered would furnish the contractor with useful information, and help him plan his bit program. This has been found to be a great assistance to contractors coming into a new area.

- All too frequently the mud programs recommended by mud companies are changed many times apparently without reason. These changes cost the drilling contractors many thousands of dollars.

**Summary.** This situation, which is vital to the welfare of the drilling industry, is a direct challenge to the scientific, operating and economic ability of all concerned, and too much emphasis cannot be placed on the inestimable benefits of free and complete coperation between companies and contractors for mutual benefit.

—The End

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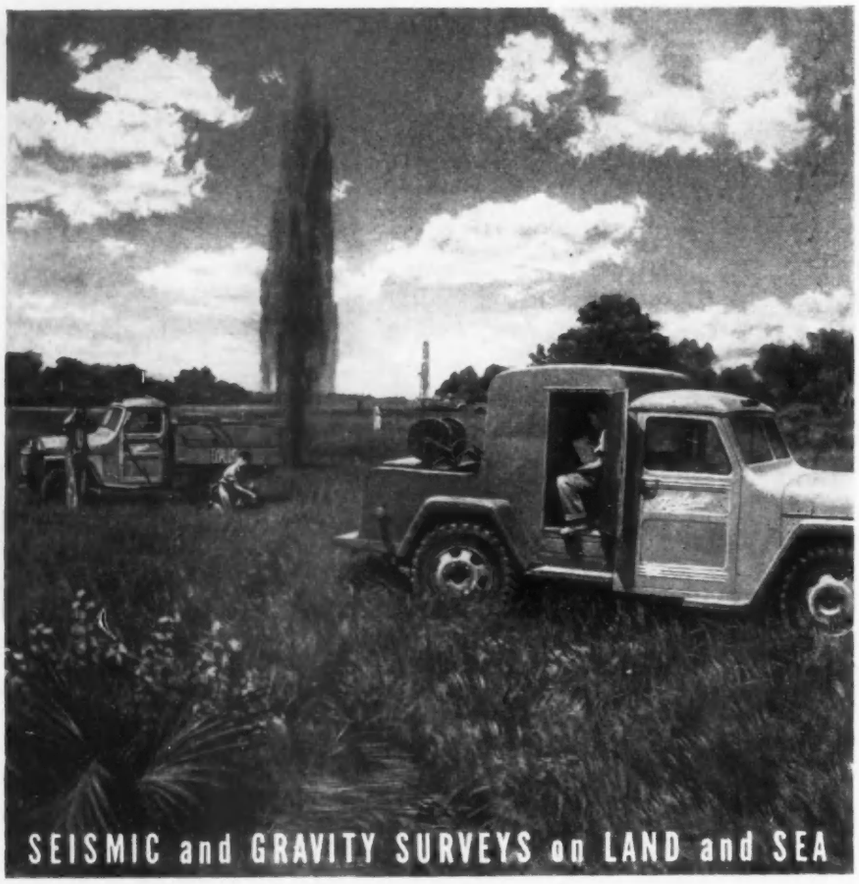


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- **Drilling Section** *Page 193*
- **Production Section** *Page 249*
- **Pipe Line Section** *Page 303*

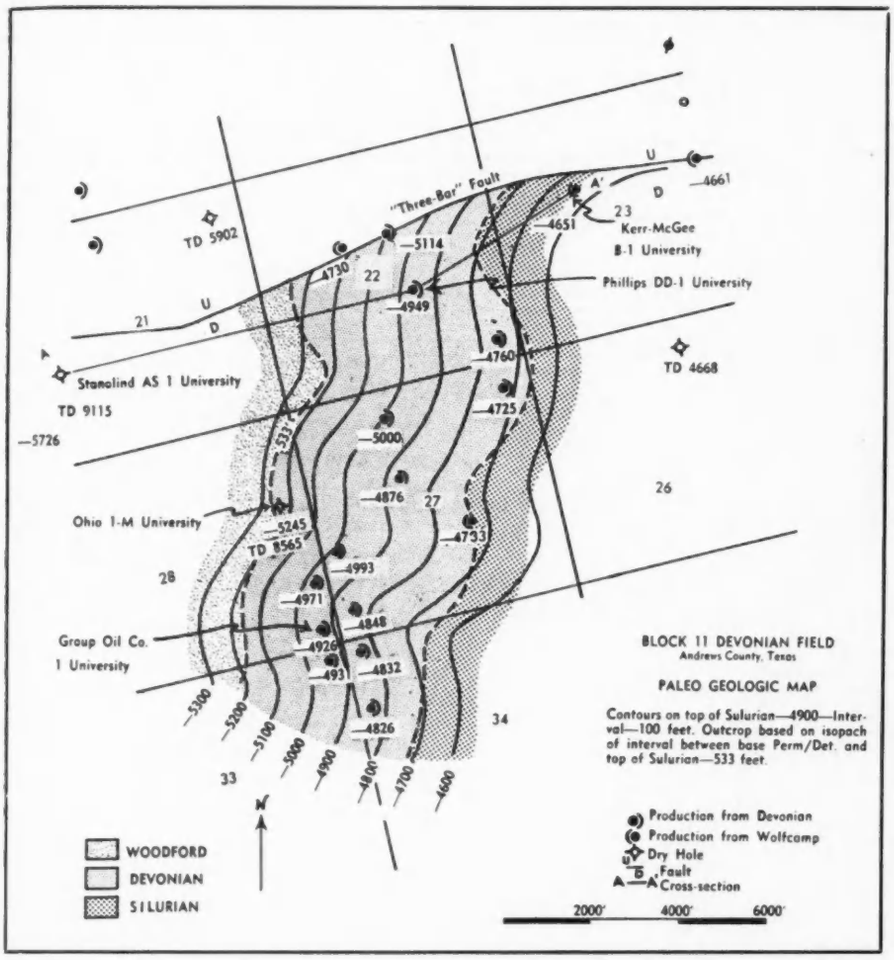


Fig. 1—Paleo-geologic map of the Block 11 Devonian field of Andrews County, Texas, showing extent of Devonian section and wells drilled up to April, 1953.

# Truncation-Type Traps Offer a New Horizon

**• Block 11 Devonian Field adds significance to this type of reservoir.**

**• More difficult to find, risk is greater, and extent may be limited.**

**• Another type field to be added to existing structures of the Permian Basin.**

**By JOHN RYAN,** Murphy Corporation, Midland, Texas

THE CENTRAL BASIN PLATFORM of West Texas has offered a wide range of petroleum traps for interpretation by the geologist. The spotlight has been focused on anticlines, reefs, and porosity lenses, these being three of the most important reservoir producers, while the relatively minor type traps have received only sporadic attention. Of these minor traps, the truncation type is not only one of the most interesting, but possibly one of the most undeveloped.

During Pennsylvanian time a tremendous upheaval occurred that, in part, resulted in the formation of the Central Basin Platform of West Texas and Southeast New Mexico. Sharp relief existed on this positive area in anticlinal ranges and domes along with numerous fault scarps. The errosional period following the upheaval saw a considerable portion of the exposed rocks removed, leaving a heavily truncated surface as the sea floor for Permian waters. Sharply tilted beds were beveled, and in places, the high crests of the anticlines were often reduced to such an extent as to expose the basement granite with the younger sedimentaries forming a hole around it.

The problem confronting the petroleum geologist is to interpret trap characteristics not only on the structurally closed crests of the anticlines, but also on the far flanks in the beveled younger beds. Once their areal extent has been established, it is also necessary to determine the reservoir potential of the beds present, based on their normal inheritance of primary porosity development or on a possibility of a secondary occurrence, assuming a source of oil is present for migration to such a reservoir.

The Devonian Section offers one of the best chances for a combination of these two essentials, although not conclusive, criteria for truncation traps. It was the subject of considerable errosion and weathering during the previously mentioned post-movement period. It also enjoys the reputation of being a prolific and widespread producer on the Central Basin Platform.

**Block 11 Devonian Field.** The Block 11 Devonian field in Andrews County is an excellent example of a truncation type trap. Its discovery was primarily due to interpretation of local subsurface data gathered from test wells in the area. Three Bar field, one mile to the north, already established the presence of the Devonian pay section in the area, being a truncation type trap itself. In a two location south stepout to this field, the Stanolind Oil and Gas Company AS-1

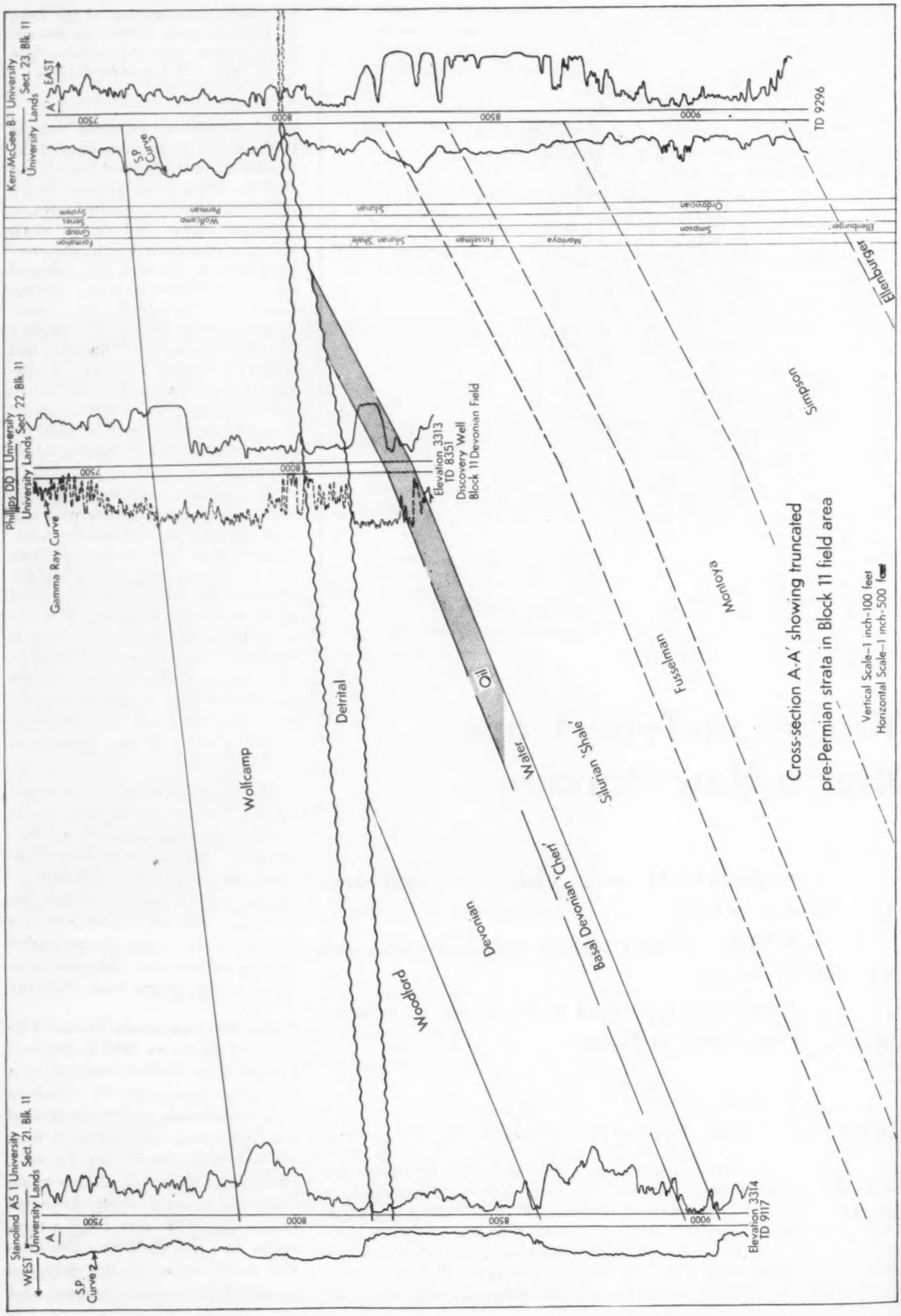


**Fig. 2—Truncated pre-Permian strata are clearly shown on this cross section taken through A - A' on Fig. 1.**

University, crossed a fault that proved to be the south confining boundary of the field. The pre-Permian Section of this well, a dry hole, had Woodford shale beneath Permian and overlying a full Devonian section including the "Three Bar" pay zone. Assuming the Devonian could "pay" on the down thrown side of the fault in a similar type trap and up dip or out of water, the Kerr-McGee B-1 University was drilled 2½ miles east of the Stanolind test. This test found Silurian rocks underlying the Permian, thus necessitating the Devonian to bevel out between these two wells. The Phillips Petroleum Company DD 1 University confirmed this interpretation, being completed as the discovery well of the Block 11 Devonian field. The Block 11 Southwest Devonian field, being a south extension to the Block 11 Devonian and hereafter treated as such in this discussion, was drilled by Group Oil Company up dip from a dry hole, the Ohio Oil Company 1-M University, on the west edge of the field. The Ohio well encountered a good show of oil in the "Three-Bar Chert" along with salt water, suggesting the probability that it cut the oil-water contact near the top of the pay zone and moving up dip would place the pay section out of water.

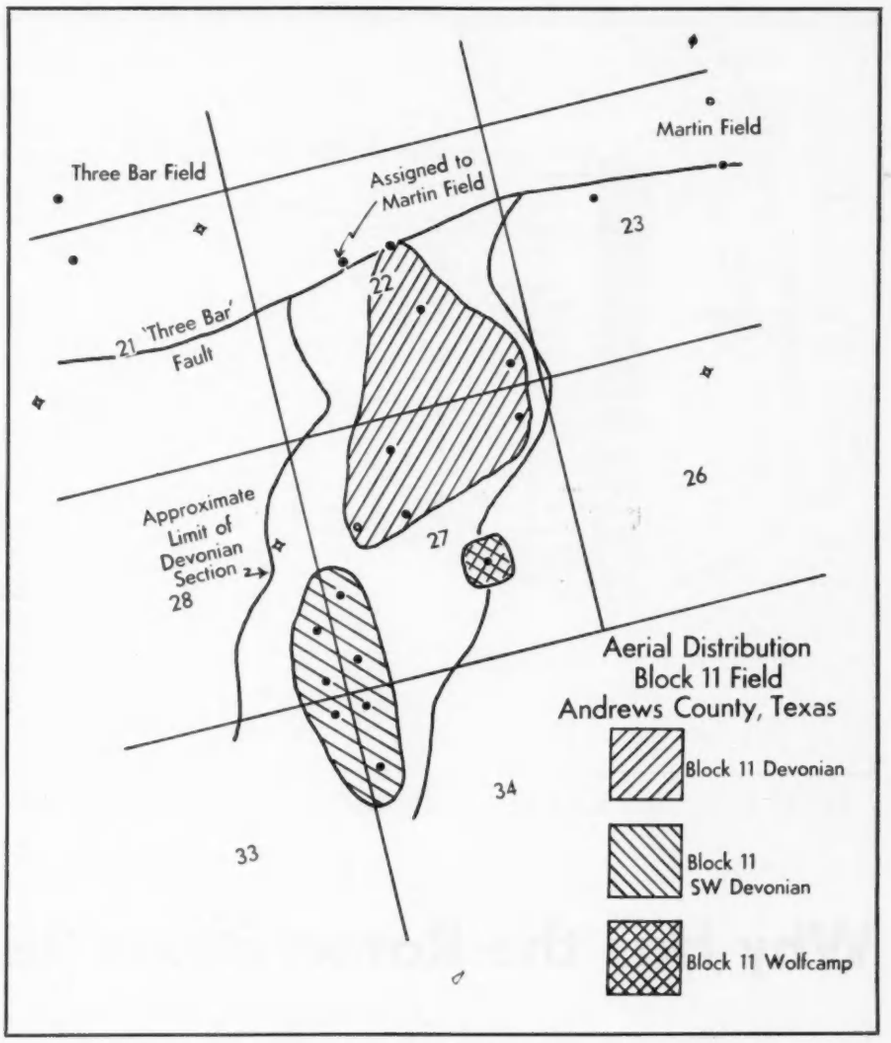


Fig. 3—Distribution of production in the Block 11 field of Andrews County, Texas, showing the two Devonian fields and the one-well Wolfcamp field.

**Pre-Permian beds.** The pre-Permian beds in the field area dip from east to west. They were once low on the flanks of a tremendous anticlinal structure (Embar) which was one of a series of folds, trending northwest-southeast, that were formed during the previously mentioned platform building upheaval of Pennsylvanian time. The Devonian beds were stripped off the crest of the Embar structure far down on its west flank. Its beveled edge, covered by detrital, was then subjected to Permian depositions. The fault forming the north limit of the field occurred concurrent with the structure building. The Block 11 Devonian was on the downthrown side, thus after erosion, the truncated Devonian surface is offset to the east or "up dip" at the "Three Bar" Devonian on the up-thrown side.

**Development.** The Block 11 field is in an early stage of development. The productive area, including only that which has been proven by completed wells, covers approximately 780 acres. The east and west sides are only partially defined, the south side is not defined, while the north end is limited by the "Three Bar" fault. The reservoir rock, being Basal Devonian chert and limestone, averages approximately 70 feet in thickness. Elevation on top of the oil column at an intermediate location is (—) 4917, the bottom being (—) 4987. The chert, ranging from 40-80 percent, is highly fractured, cream colored and includes some brown, weathered chert. The limestone is white to buff in color and varies in texture from finely crystalline to very coarsely crystalline, and is generally chalky. The reservoir has a solution gas drive. Crude oil has an

Continued on Page 184

## About the Author

JOHN RYAN is a petroleum geologist for Murphy Corporation at its Midland, Texas, offices. He was graduated from Texas Western College of the University of Texas in 1949 with a B.S. degree in geology. Upon graduation, he was employed by Texas University Lands as a geologist in Midland. He was a senior geologist at the time of his resignation in 1952 when he joined Murphy Corporation.

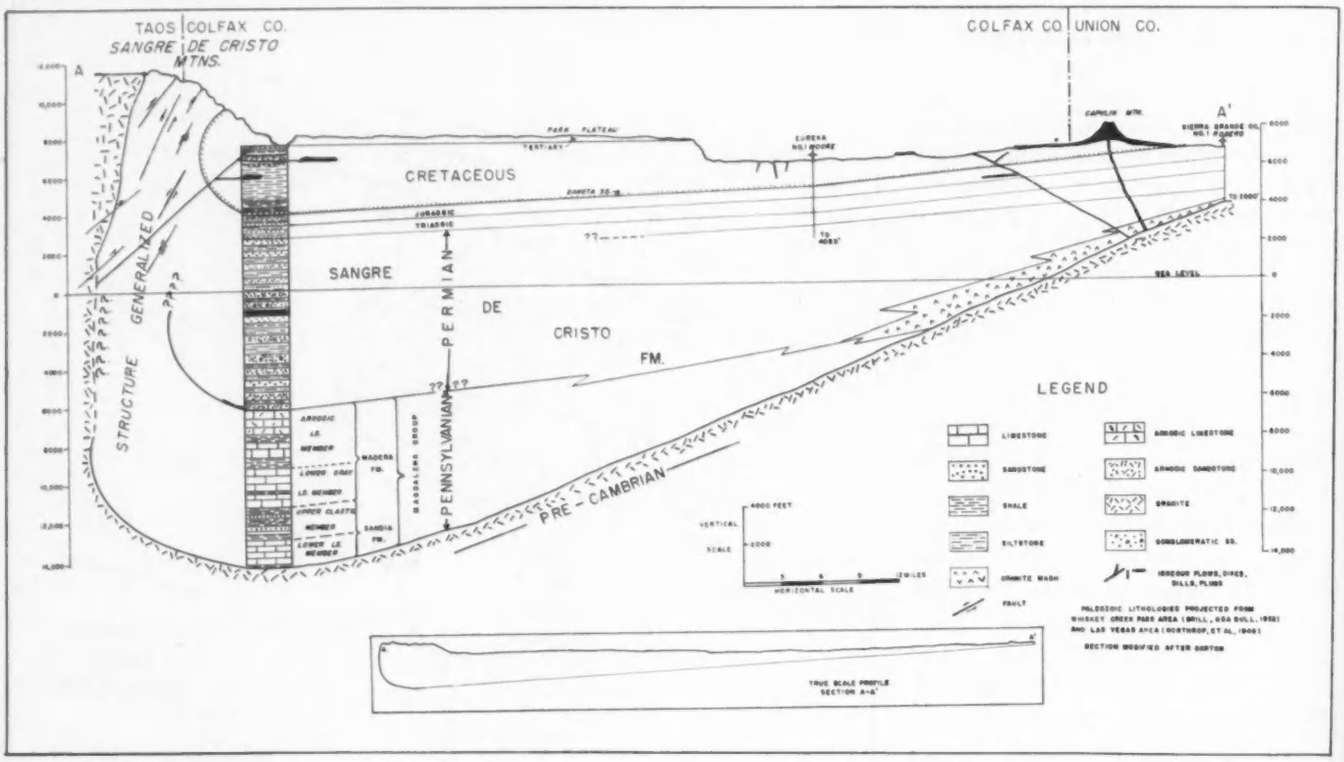


**Fig. 1.**—Section across Raton Basin, Taos, Colfax and Union counties, New Mexico . . . an area overlooked by the industry.

# Why Has the Raton Basin Been Ignored?

**The hazards have made wildcatters reluctant. But present knowledge calls for the reevaluation of the area.**

**By WILLIAM A. HECK,** Horizon Well Logers, Midland, Texas

DESPITE THE IMPORTANCE of basin exploration the oil industry has long ignored one important basin in which the sedimentary section may exceed 20,000 feet in thickness.

This is the Raton-Mora Basin, part of a large geosyncline that extends from north-central Colorado into north-central New Mexico. In this trough a considerable thickness of marine sediments were deposited, indicating that source beds for petroleum are present. Yet a cursory glance at an oil development map of the area shows that the industry has overlooked the basin's potentialities.

Part of the answer lies in the difficulty and hazards of projecting basinward from the outcrops in the Sangre de Cristo Mountains, sediments which are in an area in which swift facies changes are the rule. Ordinarily, the lack of sufficient geologic data has not deterred wildcatters from sinking test wells. But when the area happens to be one in which considerable volcanic material is present, the challenge becomes too formidable for most operators.

However, meager as the data are, they are sufficient to warrant that the enigma of the Raton Basin has been resolved; and present knowledge warrants a reevaluation of the basin's potentialities as a promising area for exploring for oil and gas.

The Raton Basin is a major structural depression lying between the Sangre de Cristo Range and a buried granite ridge, the Sierra Grande-Las Animas Uplift. The Colorado portion of the basin is in Huerfano and Las Animas counties, and that in New Mexico occupies parts of Colfax, Mora, and San Miguel counties.

**Basin Structure.** The basin is about 100 miles wide near the Colorado-New Mexico line and narrows northward and southward. Effective closing of the basin in the south is accomplished by a near merging of the subsurface granite ridges and the faulted front of the Sangre de Cristo Mountains near Las Vegas, New Mexico. The northern limit in southern Huerfano County, Colorado, is less marked.

The basin terminates westward against the faulted front of the Sangre de Cristo Range. Upthrusting was quite pronounced, and some of the Paleozoic section crops out in the mountains at elevations over 10,000 feet. Laramide orogeny effectively created an assymmetric structural basin out of an essentially symmetrical depositional trough.

This geosyncline, whose axis of major depression closely paralleled the present front of the Sangre de Cristo Range, extended from north-central Colorado into north-eastern New Mexico in late Paleozoic time. The Raton-Mora portion of the trough was confined on three sides by land masses of considerable size, the Pedernal Highland, the Sierra Grande-Front Range Highland, and the Uncompahgre Highland to the south east, and west respectively. A northern limit to the Raton Basin may occur in Huerfano County, Colorado, where a constriction in the trough is indicated.

In the deepest part of this confined trough, which had its greatest subsidence in late Paleozoic times, 16,000 feet of Pennsylvanian and Permian sediments were deposited, followed later by the deposition of approximately 4000 feet of Mesozoic and Tertiary sediments. Quarternary lava flows and intrusions occur, scattered throughout the basin. No identifiable pre-Pennsylvanian rocks are present in the Raton Basin part of the trough.

Of the 20,000 feet of sediment which may occur in the trough, the only extensive development of marine section appears to be in the Pennsylvanian and Cretaceous rocks. The Cretaceous, despite its great thicknesses of black and dark grey shale, does not appear to contain the production possibilities of the deeper Paleozoic zones, in part due to outcroppings on both sides of the basin, which would permit fluids to migrate out of the beds.

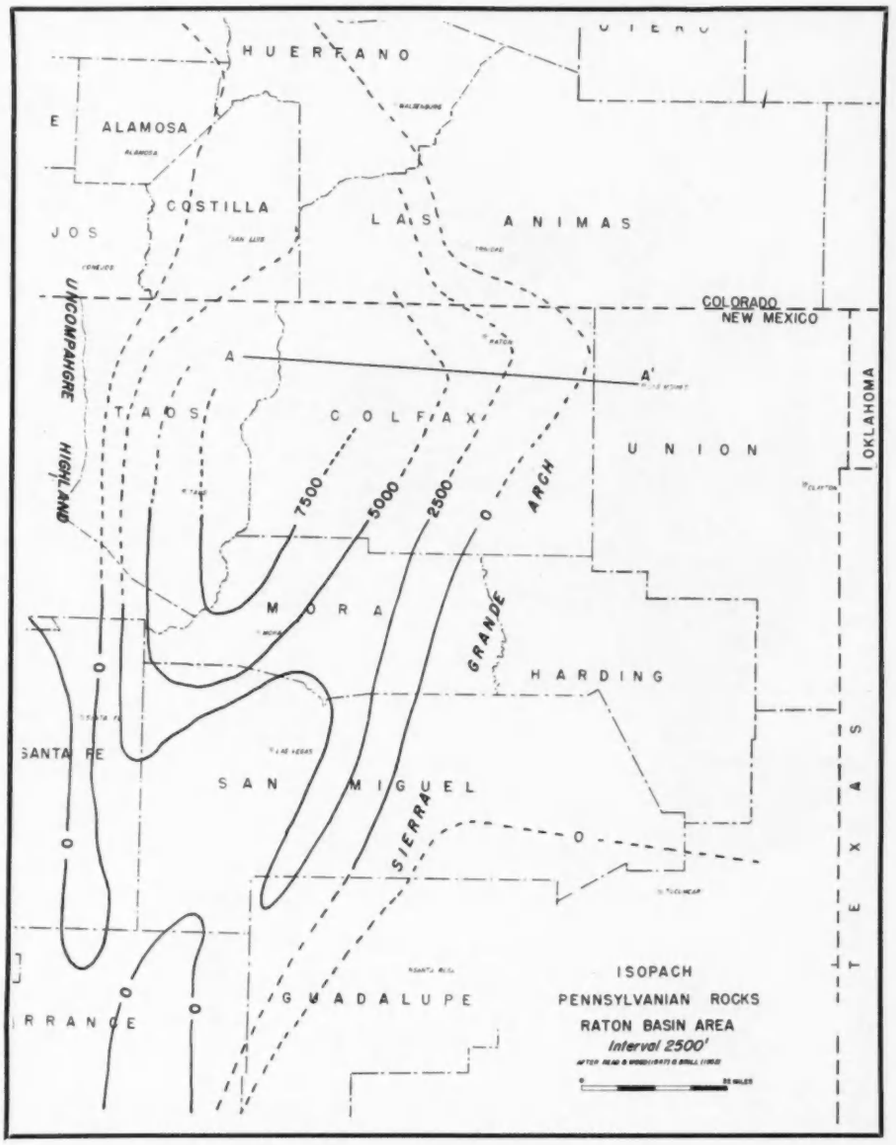


**FIGURE 2**

**Pennsylvanian rocks** should attain a thickness of approximately 8000 feet in Las Animas County, Colorado, and Colfax County, New Mexico. (Figure 2.) The lithologic character of the Pennsylvanian rocks present in the deeper portions of the basin must be inferred, because no wells have penetrated the Pennsylvanian section except in the southernmost part of the basin. Exposures of the Pennsylvanian rocks near the Taos-Colfax County line suggest near shore sedimentation and rhythmic deposition, one author having described 68 cyclothems in predominantly clastic rock. However, certain zones of limestones have been traced for several hundred miles along the trough, indicating that a marine sea of considerable areal extent was present. For this reason and because of a consideration of the more distant location of the center of the trough from the clastic contributing land masses, a rather thick Pennsylvanian limestone section is shown in Figure 1. Shifts of lithofacies along and across the trough make the inference hazardous, but until the Paleozoic section is defined by drilling, theorizing is necessary.

Overlying the Pennsylvanian marine section are red beds and arkoses of the Sangre de Cristo (Abo) formation. The base of this formation interfingers with Pennsylvanian rocks, but the bulk of the formation is probably Permian. Piedmont type deposition is indicated, and the production possibilities are therefore somewhat limited.

Sedimentation on the positive elements bordering the trough did not occur until late in the Permian, so that all the Pennsylvanian and most of the Permian deposition was limited to the trough. There is, therefore, a loss of about 15,000 feet of section by overlap from the center to the borders

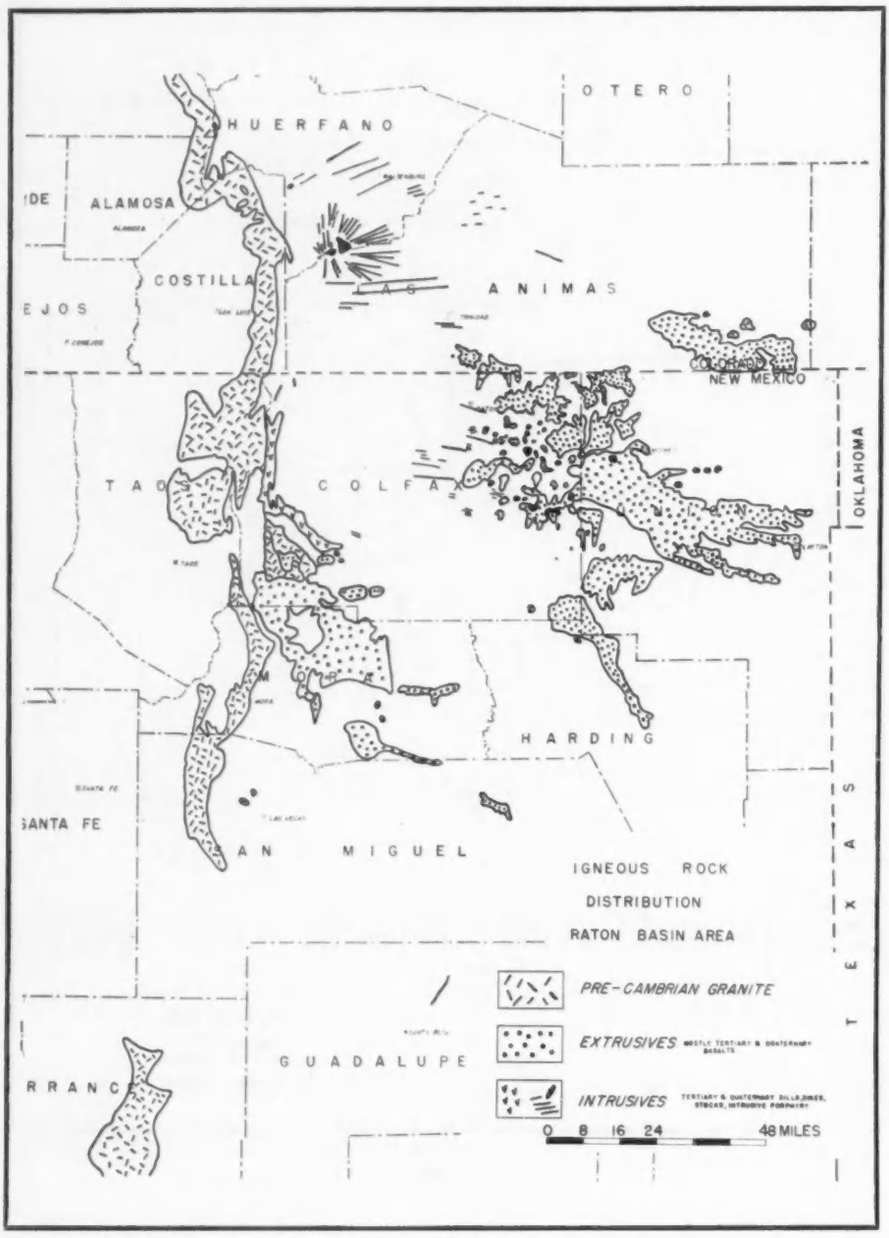


**FIGURE 3**

of the trough, which amounts to approximately 200 feet per mile in the widest portion of the basin.

Extensive vulcanism occurred in the Raton Basin area in Quarternary time, and extruded more than 1200 square miles of igneous material. (Figure 3.) These flows, together with numerous dikes, plugs, feeders, and stocks, have been partly responsible for the lack of exploratory activity in the basin. The following points should be considered when interpreting the effects of the igneous activity on the possible oil bearing strata:

- The large areal extent of the extruded material on the surface is deceptive in that it does not necessarily show the magnitude of intrusive activity which would disturb the sediments and complicate the problems of the oil geologists. Actually, the feeders, vents, stacks and dikes constitute a small fraction of the total bulk of igneous material at the surface.

- The intensity of igneous activity in the subsurface is not known, although occasional sills have been reported in test wells. Petrographic studies of the igneous rock in eastern Colfax and Union counties, New Mexico, indicate that these rocks may have had a common magmatic reservoir, and therefore the sedimentary section may not be pierced by as many large intrusives as a cursory glance would suggest.

- Most of the igneous rocks are of basaltic composition, except in the Spanish Peaks area. Basaltic rocks permit only limited escape of volatiles that tend to sweep petroleum out of the contiguous sedimentary rock.

- Plugs, dikes and sills are generally not structure formers, so that some sedimentary structures in the basin may be of genuine tectonic origin.

- Vulcanism does not in itself condemn an area. Of the more than two billion barrels of oil produced in Mexico to the end of 1948, 93 percent had come from the fields in the Tampico embayment region, where numerous basaltic plugs occur between the fields.

Most of the exploratory tests have been drilled along the Sierra Grande-Las Animas uplift and in the shallow southern extremity of the basin. The wells were generally located on surface structures, with apparently little regard for the stratigraphic trap possibilities.

Of the 50 exploratory tests drilled in the approximately 8000 square miles occupied by the Raton Basin, 36 wells have been less than 3000 feet in depth, and only one has exceeded 7000 feet. Wells drilled in the deeper portion of the basin in Las Animas County, Colorado, and Colfax County, New Mexico, have not been of sufficient depth or have been too far up the flanks of the Sierra Grande arch to penetrate the Pennsylvanian rocks.

Numerous oil and gas shows in the Mesozoic and Paleozoic rocks have been reported from the wells drilled in San Miguel County, New Mexico, and from other shallow wells along the Sierra Grande arch. However, commercial production is found only in the Garcia gas field of Las Animas County, Colorado, high on the arch, where a sandy facies in the Cretaceous shales serves as a reservoir.

Evaluation of data from test wells is difficult because of the many inaccuracies in the reported information. A majority of the wells were drilled in the 1920's, and only driller's logs are available. Considerable con-

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fusion has resulted because of the difficulty in differentiating drilled granite from arkosic debris and wash material. Many of the wells reported bottomed in Pre-Cambrian granite were probably in some arkosic part of the sedimentary section.

**Stratigraphic traps** in numbers are indicated along the western flank of the Sierra Grande-Las Animas uplift, where extensive overlapping of the Paleozoic sediments occurred. These stratigraphic wedges should extend a considerable distance up the flanks if the loss of section is as great as calculated. Sedimentation in intracratonic basins is rather complex, and numerous changes in lithofacies occur. Stratigraphic traps caused by facies change should be rather common, and need not necessarily be associated with the arch. Also wedge arkoses may serve as traps along the granite ridges.

Structures, unless associated with wedgeouts, appear to be of lesser significance, because migration of the fluids might have occurred, unless contained by very strong closures Beds which are present above 10,000 feet in the mountains and are capable of taking on water, are below 5000 feet in the subsurface. The hydrostatic head should be considerable, and flow of fluids through the rocks may be rapid enough to dislodge oil in structures.

The large hydrostatic pressures which may be encountered should be considered in establishing operating procedures for any projected test of the Paleozoic sections in the deeper parts of the basin.

**Conclusion.** A considerable thickness of marine Pennsylvanian and nonmarine Permian rocks is present in the Raton-Mora Basin. All of the Pennsylvanian and most of the Permian rocks are absent over the Sierra Grande arch, where the Upper Permian rests directly on granite at rather shallow depths. The loss of late Paleozoic section by overlap on the Sierra Grande arch across the basin may approach 15,000 feet.

The geology indicates that possible reservoirs in the Paleozoic may be found in:

## About the Author

WILLIAM A. HECK received his B.A. degree in geology from Lehigh University, Bethlehem, Penn., in 1948. From 1948 until March, 1951, he was employed by the U. S. Geological Survey in Tennessee, Kentucky and Texas. After leaving the Survey he organized the Horizon Well Logging Company and became active as a consulting geologist in the West Texas-New Mexico area. His headquarters are at Midland, Texas.

- Stratigraphic traps along the west flank of the Sierra Grande arch, caused by overlap of Pennsylvanian rock.
- Stratigraphic traps caused by facies change.
- Structures: provided closure is sufficient to counteract the effect of fluid movements in the beds.

Oil possibilities in the Mesozoic are overshadowed by the greater Paleozoic possibilities. Sandy facies in the thick shale sections of the Cretaceous may locally offer some chance for commercial production.

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## Truncation-Type Traps

*Continued from Page 179*

API gravity (at 60° F.) of 41.0. Gravity of the gas is 0.8472. Although water is found on the extreme west flank of the field, there is no evidence of an active water drive.

**Well completions.** Completion practices vary only slightly, for all practical purposes, between operators. General procedure is to set a 5½-inch oil string to bottom and perforate the pay section with an average of six shots per foot. Seven of the 13 producing wells in the field (Block 11 Devonian and Block 11 Southwest Devonian) were completed natural, four were washed with 500 gallons of acid, while two received special attention. One Devonian well, cutting the fault serving as the north boundary of the field, took 17,000 gallons of acid in four stages along with a 3000-gallon formation fracture treatment before the last acid stage. The other well was treated with 2600 gallons of acid in two stages, being washed with 600 gallons and then treated with 2000 gallons.

**A look ahead.** In due time, the search for truncation type traps will be of considerable importance on the Central Basin Platform. Considering the substantial amount of subsurface control needed to accurately interpret a potential reservoir in truncated rocks, along with a high degree of luck, producing companies find it hard to justify the high cost of drilling such tests. Possible pay sections are necessarily at a minimum inasmuch as a portion of the rocks were removed, thus there exists a greater element of risk. In the future, perhaps cheaper drilling costs and a better price for oil will stimulate exploration for more truncation type traps.

**Production History**

| RESERVOIR | Year | WELLS PRODUCING AT END OF YEAR | | OIL PRODUCTION IN BARRELS | |
|---|---|---|---|---|---|
| | | Flow | Pump | Yearly | Cumulative |
| Block 11 Devonian | 1951 | 1 | 0 | 3,780 | 3,780 |
| | 1952 | 4 | 1 | 186,639 | 190,419 |
| As of April | 1953 | 5 | 1 | 102,677 | 293,096 |
| Block 11 Southwest Devonian | 1952 | 1 | 0 | 7,741 | 7,741 |
| As of April | 1953 | 7 | 0 | 74,709 | 82,450 |
| Field Total as of April, 1953 | | | | | 375,546 |

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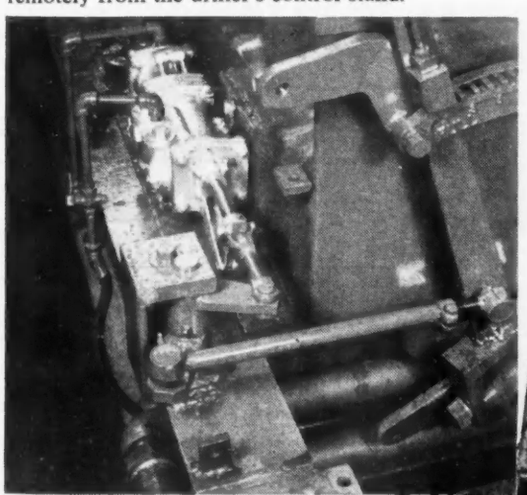
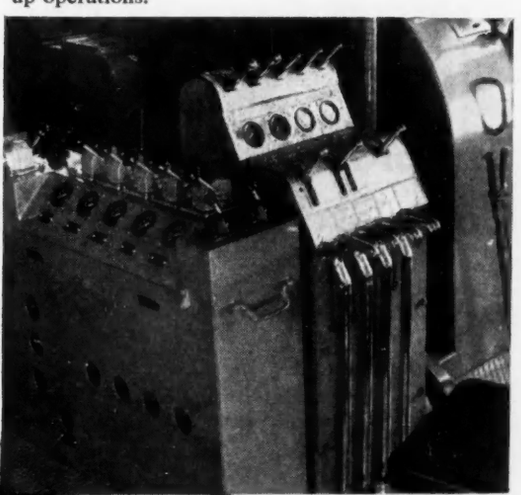
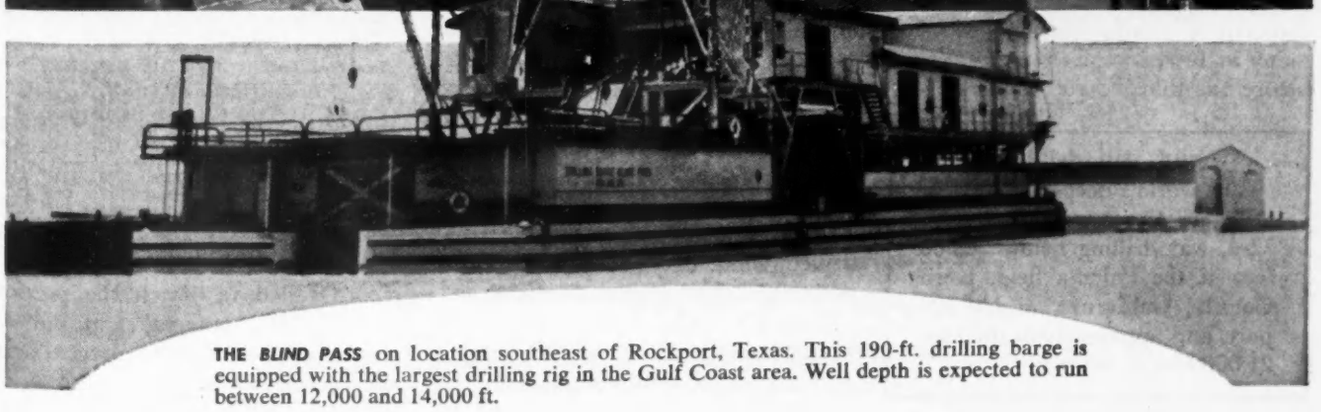


**ALL CONTROLS** for the rig of the *Blind Pass* are centralized on this control stand. Just by moving a few finger-operated levers, the driller can control every engine operation. Westinghouse Air Brake pneumatic controls make the driller's job easier and speed up operations.





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| State or District | MONTH OF AUGUST, 1953 | | | | | | | | | | | | | FIRST EIGHT MONTHS, 1953 | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Productive Tests | | | | | | | | | Total Productive | Unproductive Tests | | | Total Exploratory Tests | Productive Tests | | | | | | | | | Total Productive | | Unproductive Tests | | | Total Dry | | Total Exploratory Tests | |
| | New Fields | | | New Pays | | | Extensions | | | | Wildcats | New Pays | Outposts | | New Fields | | | New Pays | | | Extensions | | | $ Mo. 1953 | $ Mo. 1952 | Wildcats | New Pays | Outposts | $ Mo. 1953 | $ Mo. 1952 | $ Mo. 1953 | $ Mo. 1952 |
| | Oil | Dis. | Gas | Oil | Dis. | Gas | Oil | Dis. | Gas | | | | | | Oil | Dis. | Gas | Oil | Dis. | Gas | Oil | Dis. | Gas | | | | | | | | |
| Alabama | | | | | | | | | | | 9 | | | 9 | | | | | | | | | | | | 53 | | | 53 | 3 | 53 | 3 |
| Arizona | | | | | | | | | | | | | | | | | | | | | | | | | | 6 | | | 6 | | 6 | |
| Arkansas | 1 | | | | | | 2 | | | 3 | 10 | | 1 | 14 | 9 | | 1 | 10 | | | 2 | | | 22 | 2 | 80 | | 1 | 81 | 13 | 103 | 15 |
| California | 1 | | 1 | 4 | | 1 | 2 | | | 9 | 39 | 1 | 2 | 51 | 12 | | 4 | 19 | | 5 | 15 | | 1 | 56 | 11 | 282 | 1 | 26 | 309 | 40 | 365 | 51 |
| Colorado | 4 | | | 1 | | | | | | 5 | 31 | | | 36 | 17 | 1 | 9 | 1 | | 1 | 2 | | | 31 | 3 | 198 | | | 198 | 31 | 229 | 34 |
| Florida | | | | | | | | | | | 3 | | | 3 | | | | | | | | | | | | 23 | | | 23 | | 23 | |
| Georgia | | | | | | | | | | | 1 | | | 1 | | | | | | | | | | | | 4 | | | 4 | | 4 | |
| Idaho | | | | | | | | | | | | | | | | | | | | | | | | | | 4 | | | 4 | | 4 | |
| Illinois | 2 | | 1 | 1 | | | 5 | | | 9 | 50 | | | 59 | 12 | | 1 | 11 | | | 31 | | | 55 | 14 | 298 | | | 298 | 76 | 353 | 90 |
| Indiana | 1 | | | | | | | | | 1 | 35 | | | 36 | 19 | | 2 | 1 | | 1 | 5 | | | 28 | 4 | 237 | | | 237 | 32 | 265 | 36 |
| Kansas | 13 | | 1 | | | | 1 | | 2 | 17 | 95 | | | 112 | 94 | | 16 | 3 | | | 4 | | 2 | 119 | 7 | 607 | | | 607 | 73 | 726 | 80 |
| Kentucky | 2 | | | | | | | | | 2 | 9 | | | 11 | 15 | | 1 | | | | 2 | | | 18 | 4 | 73 | | | 73 | 13 | 91 | 17 |
| Louisiana | 5 | 1 | | 3 | | 2 | 1 | | | 12 | 42 | | | 54 | 23 | 12 | 1 | 28 | 7 | 7 | 8 | 4 | 1 | 91 | 10 | 249 | | 4 | 253 | 37 | 344 | 47 |
| North Louisiana | 2 | | | | | 1 | 1 | | | 4 | 20 | | | 24 | 5 | 4 | | 4 | 1 | 1 | 5 | | | 20 | 2 | 122 | | 3 | 125 | 25 | 145 | 27 |
| South Louisiana | 3 | 1 | | 3 | | 1 | | | | 8 | 22 | | | 30 | 18 | 8 | 1 | 24 | 6 | 6 | 3 | 4 | 1 | 71 | 8 | 127 | | 1 | 128 | 12 | 199 | 20 |
| Michigan | 1 | | | | | | | | | 1 | 30 | | | 31 | 7 | | | 4 | | | 4 | | | 15 | 2 | 163 | | | 163 | 17 | 178 | 19 |
| Mississippi | 1 | | 1 | | | | | | | 2 | 14 | | 1 | 17 | 7 | 2 | 3 | 4 | 1 | | 2 | 1 | | 20 | | 131 | | 6 | 137 | 17 | 157 | 17 |
| Missouri | | | | | | | | | | | | | | | | | | | | | | | | | | 8 | | | 8 | | 8 | |
| Montana | 1 | | | | | | | | | 1 | 5 | | | 6 | 7 | | | 2 | | | 1 | | | 10 | | 56 | | | 56 | 12 | 66 | 12 |
| Nebraska | 2 | | 1 | | | | | | | 3 | 10 | | 1 | 14 | 15 | | | 3 | | | 2 | | 1 | 21 | 4 | 98 | | 2 | 100 | 22 | 121 | 26 |
| Nevada | | | | | | | | | | | 1 | | | | | | | | | | | | | | | 8 | | | 8 | | 8 | |
| New Mexico | 2 | | 2 | | 1 | | 1 | | 2 | 8 | 12 | | | 20 | 14 | | 13 | 1 | 1 | | 5 | | 4 | 38 | 5 | 92 | | | 92 | 9 | 130 | 14 |
| North Carolina | | | | | | | | | | | 1 | | | 1 | | | | | | | | | | | | 1 | | | 1 | | 1 | |
| North Dakota | 1 | | | | | | | | | 1 | 8 | | | 9 | 7 | | | | | | 2 | | | 9 | 1 | 38 | | | 38 | | 47 | 1 |
| Ohio | | | | | | | | | 1 | 1 | 2 | | | 3 | | | | | | | 2 | | 2 | 4 | | 12 | | | 12 | 3 | 16 | 3 |
| Oklahoma | 12 | | 1 | 1 | 1 | | 6 | | | 21 | 70 | | | 91 | 74 | 6 | 15 | 20 | 1 | 1 | 44 | 1 | 5 | 167 | 21 | 483 | | | 483 | 80 | 650 | 101 |
| Pennsylvania | | | | | | | | | | | | | | | | | | | | | | | 1 | 1 | | | | | | | 1 | |
| South Dakota | | | | | | | | | | | 6 | | | 6 | | | | | | | | | | | | 14 | | | 14 | | 14 | |
| Texas | 39 | 3 | 7 | 16 | 6 | 2 | 14 | 2 | 3 | 92 | 361 | | 6 | 459 | 336 | 48 | 65 | 164 | 32 | 18 | 99 | 16 | 16 | 794 | 78 | 2774 | | 73 | 2847 | 294 | 3641 | 372 |
| Dist. 1 S. Central | 3 | | | | | 1 | | | | 4 | 22 | | | 26 | 11 | 2 | 3 | 1 | 2 | 1 | 1 | 1 | | 22 | 1 | 209 | | 7 | 216 | 29 | 238 | 30 |
| Dist. 2 Middle Gulf | 1 | 1 | 3 | 1 | 2 | 1 | 1 | | | 10 | 26 | | | 36 | 12 | 8 | 9 | 8 | 5 | 2 | 4 | 1 | 2 | 51 | 7 | 186 | | 4 | 190 | 27 | 241 | 34 |
| Dist. 3 Upper Gulf | 4 | | 1 | 1 | 2 | | 1 | 2 | 2 | 13 | 30 | | 3 | 46 | 21 | 9 | 5 | 32 | 13 | 7 | 9 | 10 | 7 | 113 | 16 | 240 | | 43 | 283 | 18 | 396 | 54 |
| Dist. 4 L. Gulf-SW | 9 | 2 | | 6 | 2 | | | | 1 | 20 | 50 | | 1 | 71 | 33 | 19 | 22 | 42 | 11 | 7 | 2 | 2 | 4 | 142 | 10 | 317 | | 4 | 321 | 19 | 463 | 29 |
| Dist. 5 E. Central | | | | | | | | | | | 8 | | | 8 | 3 | 1 | 1 | 2 | | | | | | 7 | | 82 | | | 82 | 13 | 89 | 13 |
| Dist. 6 Northeast | 1 | | | 1 | | | 1 | | | 3 | 11 | | 2 | 16 | 5 | 3 | | 5 | | | 1 | | | 14 | | 94 | | 2 | 96 | 8 | 110 | 8 |
| Dist. 7-B N. Cent. | 6 | | | | | | 3 | | | 9 | 85 | | | 94 | 104 | | 15 | 24 | | | 20 | 1 | 1 | 165 | 17 | 639 | | 1 | 640 | 63 | 805 | 80 |
| Dist. 7-C W. Cent. | 2 | | 2 | 1 | | | 2 | | | 7 | 34 | | | 41 | 39 | 5 | 5 | 14 | | | 7 | | | 70 | 7 | 232 | | 2 | 234 | 24 | 304 | 31 |
| Dist. 8 West | 6 | | 1 | 3 | | | 4 | | | 14 | 34 | | | 48 | 48 | 1 | 2 | 12 | 1 | | 22 | | | 86 | 8 | 246 | | 2 | 248 | 34 | 334 | 42 |
| Dist. 9 North | 7 | | | 3 | | | 2 | | | 12 | 58 | | | 70 | 59 | | 3 | 24 | | 1 | 32 | 1 | 2 | 122 | 12 | 524 | | 8 | 532 | 56 | 654 | 68 |
| Dist. 10 Panhandle | | | | | | | | | | | 3 | | | 3 | 1 | | | | | | 1 | | | 2 | | 5 | | | 5 | 3 | 7 | 3 |
| Utah | | | 1 | | | | | | | 1 | 2 | | | 3 | 3 | | | 5 | | | 1 | | | 9 | 1 | 31 | | | 31 | 5 | 40 | 6 |
| Wyoming | 1 | | 2 | | | | | | | 3 | 13 | | | 16 | 14 | | | 2 | 3 | | | | | 19 | | 80 | | | 80 | 15 | 99 | 15 |
| Total U.S. | 89 | 4 | 18 | 26 | 8 | 5 | 32 | 2 | 8 | 192 | 859 | 1 | 11 | 1063 | 685 | 69 | 147 | 265 | 42 | 33 | 231 | 22 | 33 | 1527 | 167 | 6103 | 1 | 112 | 6216 | 792 | 7743 | 959 |

# Exploratory Wells Being Completed at a Record Rate

By **CECIL W. SMITH,** WORLD OIL Staff

THE DRILLING of exploratory wells is being carried on at unprecedented rates, and August's 1063 completed tests were the highest of any month this year and it marked the fourth consecutive month that recorded as many as 1000 completed wells. Never before had that record been achieved.

**. . . and still drilling**

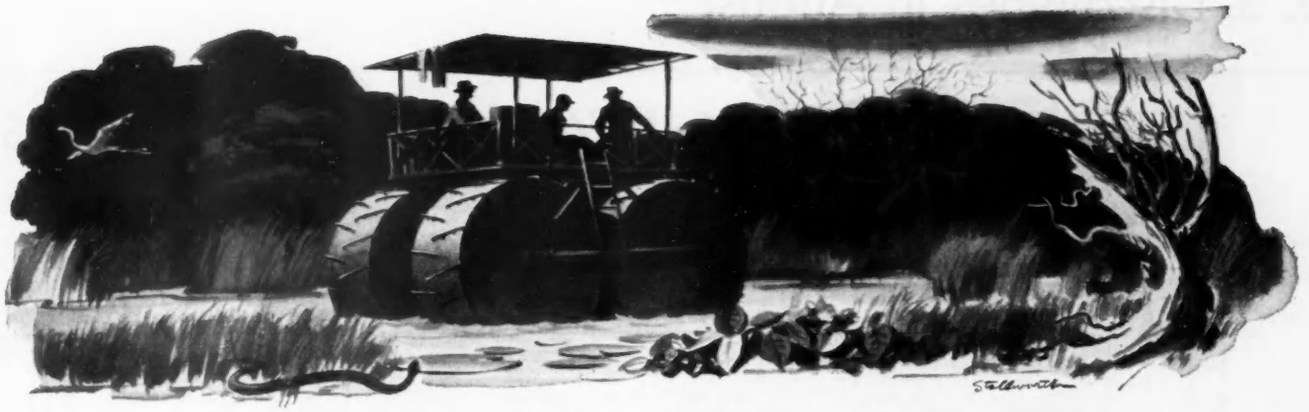
**The world's deepest well, The Ohio Oil Company's KCL "A" 72-4, was drilling below 20,900 feet in the Paloma field, Kern County, California, at last report, and apparently headed for 21,000 feet or below.**

That sustained high degree of activity has pushed the year's total exploratory wells to a total of 7743, which represented a gain of 559 wells or 7.8 percent over the 7184 recorded in the first eight months of 1952, the previous most active exploratory year. Along with the increased number of tries, a better percentage of them have proved to be successful this year over last. A total of 1527 have proved to be commercial producers this time for a score of 19.7 percent of the total drilled, while a year earlier the results were only 18.5 percent successful.

August's wells accounted for 192 producing tests and they amounted to 18.1 percent of total completed. That record failed to match the previous month's 20.2 percent, and did not quite live up to the 19.7 percent average for the year so far.

**Summary of Results of Exploratory Drilling**

| ITEM | Aug., 1953 | July, 1953 | EIGHT MONTHS January-August 1953 | 1952 | Percent Dif. |
|---|---|---|---|---|---|
| **Oil Discoveries** | 115 | 128 | 950 | 865 | + 9.8 |
| New Fields | 89 | 90 | 685 | 663 | + 3.3 |
| New Pays | 26 | 38 | 265 | 202 | + 31.2 |
| **Distillate Discoveries** | 12 | 19 | 111 | 91 | + 22.0 |
| New Fields | 4 | 12 | 69 | 80 | — 13.8 |
| New Pays | 8 | 7 | 42 | 11 | +281.8 |
| **Gas Discoveries** | 23 | 23 | 180 | 131 | + 37.4 |
| New Fields | 18 | 19 | 147 | 104 | + 41.3 |
| New Pays | 5 | 4 | 33 | 27 | + 22.2 |
| **Total Discoveries** | 150 | 170 | 1241 | 1087 | + 14.2 |
| **Extensions to Fields** | 42 | 41 | 286 | 243 | + 17.7 |
| Oil Fields | 32 | 35 | 231 | 206 | + 12.1 |
| Distillate Fields | 2 | 2 | 22 | 6 | +266.7 |
| Gas Fields | 8 | 4 | 33 | 31 | + 6.5 |
| **Total Prod. Tests** | 192 | 211 | 1527 | 1330 | + 14.8 |
| **Dry Holes** | 871 | 835 | 6216 | 5854 | + 6.2 |
| Wildcats | 859 | 820 | 6103 | 5650 | + 8.0 |
| New Pays | 1 | | 1 | 11 | — 90.9 |
| Outposts | 11 | 15 | 112 | 193 | — 42.0 |
| **Total Expl'tory Tests** | 1063 | 1046 | 7743 | 7184 | + 7.8 |
| Percent Productive | 18.1 | 20.2 | 19.7 | 18.5 | |
| Percent Dry | 81.9 | 79.8 | 80.3 | 81.5 | |



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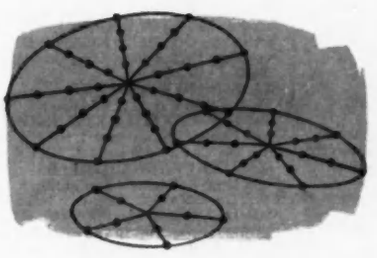

TECHNIQUE

## SEISMIC EXPLORATIONS INCORPORATED

1007 SOUTH SHEPHERD • HOUSTON, TEXAS

# U. S. Discoveries in August

## NEW FIELDS, NEW PAYS AND EXTENSIONS

| COUNTY | FIELD | COMPANY, WELL AND LOCATION | Date Completed | Total Depth (Feet) | Completion Horizon (Feet) | [1]Name, Character and Age of Producing Formation | [2]Initial Production Method and Choke | Gravity of Oil |
|---|---|---|---|---|---|---|---|---|
| | | **ARKANSAS—NEW OIL FIELD** | | | | | | |
| Miller | "Boggy Creek" | Tom Palmer et al's Fouke Est. 1, C SE NE NE 24-17s-28w | 8- 6-53 | 5097 | 4889- 4893 | Paluxy sd; L. Cre. | P 115; 2" | 31 |
| | | **ARKANSAS—OIL FIELD EXTENSIONS** | | | | | | |
| Columbia | Springhill | Mid-Continent Pet. Co.'s R. L. Ensey 1, C. NW SW 2-20s-23w, 1⅛ mi nw extension | 8-14-53 | 6068 | 6004- 6063 | Pettit li; L. Cre. | P 216 | 34 |
| Miller | Fouke, W. | Murray Pet.'s Smith Heirs 1, C NW NW NW 22-17s-27w, ¾ mi e ext. | 8-18-53 | 4513 | 3635½- 3643½ | Tuscaloosa li; U. Cre. | P. 115; 25 wtr | 32.1 |
| | | **CALIFORNIA—NEW OIL FIELD** | | | | | | |
| Kern | | R. E. Bering, Opr.'s Ripley 23-B1, in 23-11n-23w | 8-28-53 | 1280 | 947- 1280 | | P 30 | 12 |
| | | **CALIFORNIA—NEW OIL PAYS** | | | | | | |
| Kern | Wheeler Ridge | Richfield Oil Corp.'s KCL D 276-29, in 29-11n-20w | 8-31-53 | 6460 | 6229- 6457 | Vedder sd; Mio. | P 339 | 43.8 |
| Kern | Cymric | Superior Oil Co.'s Cymric Unit 1, in 22-29s-21e | 8-30-53 | 12022 | 7305- 7325 | | P 141; 7/32" | 27.6 |
| Kern | Rio Bravo | Union Oil Co.'s Kerneo 62-34, in 34-28s-25e | 8-30-53 | 13499 | 11622-11698 | U. Helbling sd; Mio. | P 330; 8/32" | 34.5 |
| Orange | Huntington Beach | Wilson Oil Co.'s Peterson 1, in 11-6s-11w (OWWO) | 8-26-53 | 5487 | 5296- 5429 | | P 200 | 28 |
| | | **CALIFORNIA—OIL FIELD EXTENSIONS** | | | | | | |
| Kern | Belgian Anticline | Honolulu Oil Corp.'s Honolulu-Watson-CCMO-Fee 1, NW SW 15-30s-21e, ½ mi sw extension | 8-15-53 | 4954 | 2852- 2867 | Phacoides sd; Mio. | P 275; 12/64" | 37.3 |
| Santa Barbara | Bradley Canyon | Standard Oil Co.'s Fugler 4-10, in 10-9n-33w, ½ mi se ext. | 8-25-53 | 7934 | 6620- 7929 | | P 127 | 12.2 |
| | | **CALIFORNIA—NEW GAS FIELD** | | | | | | |
| Solano | Kirby Hill, N. | Shell Oil Co.'s Unit B-1, NW NW 7-4n-1e | 7-29-53 | 4000 | 3515- 3555 | | F 5 mln; ½" | |
| | | **CALIFORNIA—NEW GAS PAY** | | | | | | |
| Kern | Coles Levee, S. | Kern County Land Co.'s KCY 67A-12, SW SE 12-31s-25e | 8-22-53 | 6716 | 6703- 6715 | | F 3.5 mln; ¼" | |
| | | **COLORADO—NEW OIL FIELDS** | | | | | | |
| Adams | Badger Creek, W. | Fallon Gas et al's Gov't 1, S ESE NE 21-2s-57w | 8-11-53 | 5404 | 5384- 5398 | Dakota "J" sd; U. Cre. | P 150 | |
| Adams | Mountain View, E. | Triangle J. Oil Co.'s White 1, NE NW NE 21-1s-57w | 7-20-53 | 5646 | 5576- 5594 | Dakota "J" sd; U. Cre. | P 35 | |
| Weld | | The California Co.'s Biamonte 1, SE NE NW 6-7n-66w, (OWDD) | 8- 4-53 | 8940 | 8900- 8940 | Lyons sd; Perm. | P 304 | |
| Weld | | Harry Royster's William Porter 1, NE NE NW 25-5n-61w | 8-12-53 | 6541 | 6452- 6476 | Dakota "D" sd; U. Cre. | F 240; 8/32" | |
| | | **COLORADO—NEW OIL PAY** | | | | | | |
| Logan | Liberty, W. | Vaughey & Vaughey's Jos. T. Thompson's 1, NW NE NE 18-8n-54w | 8- 2-53 | 5430 | 5310- 5313 | Dakota "D" sd; U. Cre. | P 108 | |
| | | **ILLINOIS—NEW OIL FIELDS** | | | | | | |
| Richland | Amity, S. | Ervin Drlg. Co.'s E. Ernst 1, NE SE NE 23-4n-14w, (OWWO) | 8-18-53 | 3010 | 2902- 2906 | Rosiclare li; Miss. | P 30 | |
| Richland | Amity, W. | Illinois Mid-Continent's Vail Hrs 1, NE SW SE 22-4n-14w, (OWWO) | 8-11-53 | 3100 | 2924- 2932 | Aux Vases sd; Miss. | P 13; 20 wtr | |
| | | **ILLINOIS—NEW OIL PAY** | | | | | | |
| Marion | Dix | Ashland O&R Co.'s G. W. Hiltibidal A-1, NE NE SW 28-1n-2e | 8-18-53 | 2140 | 2132- 2137 | McClosky li; Miss. | P 50; 60 wtr | |
| | | **ILLINOIS—OIL FIELD EXTENSIONS** | | | | | | |
| Christian | Assumption Consolidated | Collins Bros' E. Arthur 1, SW SE SE 34-14n-1e, ½ mi n ext. | 8- 4-53 | 2300 | 2287- 2297 | Devonian li; Devo. | P 14; 30 wtr | |
| Edwards | Maple Grove, Consolidated | W. H. Bear's Bennett-Weber Comm. 1, SW NE NW 29-1n-10e, ½ mi ext | 9- 1-53 | 3196 | 3181- 3195 | Aux Vases sd; Miss. | P 64; 20 wtr | |
| Hamilton | Cantrell, S. | C. E. Brehm's W. Mace et al 1, SE NW SW 9-7s-5e, ½ mi ext. | 8- 4-53 | 3353 | 3338- 3349 | Aux Vases sd; Miss. | P 178 | |
| Hamilton | Dale Consolidated | Calvert Drlg. Co.'s Williams-Davis Comm. 1, NE SE SE 2-7s-5e, ½ mi ext. | 9- 1-53 | 3225 | 3210- 3225 | Aux Vases sd; Miss. | P 125 | |
| Lawrence | Allendale | C. W. & J. E. Kendall's Ridgely 1, SW NE NE 24-2n-12w, 1 mi ext. | 8-18-53 | 1538 | 1537- 1538 | Tar Spring sd; Miss. | P 2; 20 wtr | |
| | | **ILLINOIS—NEW GAS FIELD** | | | | | | |
| Edgar | Dudley, W. | E. Zink's Lauher 1, NW NE NE 7-13n-13w | 8-25 53 | 428 | 380- 391 | Pennsylvania sd; Penn. | F 1 mln | |
| | | **INDIANA—NEW OIL FIELD** | | | | | | |
| Pike | | Harley R. Burton's Audrey & Delores Welton 1, SE NE SW 19-1s-8w | 8- -53 | 1502 | 1494- 1500 | Rosiclare li; Miss. | P 15 | |
| | | **KANSAS—NEW OIL FIELDS** | | | | | | |
| Barton | Red Brick | Terteling & Sons et al's Cole 1, SW SW SW 23-19s-13w | 8- -53 | 3451 | 3240- 3247 | Lansing li; Penn. | P 76 | |
| Butler | | Kewanee Oil's Hinman 2, NW NW NE 25-25s-3e | 8- -53 | 2674 | 2656- 2674 | Mississippi li; Miss. | P 10; 20 wtr | |
| Ellis | Degenhart | Bay Petroleum Co.'s Degenhart 1, NW NW SW 15-15s-17w | 8- -53 | 3555 | 3417- 3425 | Lansing-K.C. li; Penn. | P 126 | |
| Ellis | Schmeidler, NW | V. D. Sidey & Harvey Blair's Schmeidler 1, NE SE SE 20-12s-17w | 8- -53 | 3660 | 3657- 3660 | Arbuckle li; Ord. | P 30 | |
| Finney | Finnup | W. L. Hartman's Finnup 1, NE NE NW 34-22s-33w | 8- -53 | 4905 | 4756- 4762 | Mississippi li; Miss. | P 434 | |
| Meade | Bruno, NE | Columbian Fuel Corp.'s Armentrout 1-A, C SW NE 16-33s-30w | 8- -53 | 5910 | 5721- 5762 | Morrow sd; Miss. | P 1033 | |
| Morris | | Musgrove Petroleum Corp.'s Bura 1, SW NW SW 30-17s-5e | 8- -53 | 2313 | 2285- 2363 | Mississippi Chat; Miss. | P 60; 60 wtr | |
| Rice | Munyon, E. | Isern Bros' Zink 1, SE SE SE 34-18s-10w (OWWO) | 8- -53 | 3336 | 3272- 3284 | Arbuckle li; Ord. | P 15; 160 wtr | |
| Rooks | | C-G Drilling Co.'s Ordway 1-A, SW NW NE 16-10s-18w | 8- -53 | 3764 | 3444- 3447 | Lansing li; Penn. | P 22 | |
| Russell | Heim | Shelly-Miller Drilling's Heim 1, NE NE SE 21-14s-12w | 8- -53 | 3243 | 3189- 3200 | Cgl; Miss. | P 25 | |
| Sedgwick | | Charles Carlock's Nickles 1, SW SW SE 19-25s-2e | 8- -53 | 3010 | 3007- 3010 | Burgess sd; Miss. | P 15 | |
| Stafford | Taylorville | Eldorado & Rock Island Ref. Co.'s Wendelburg 1, NE NE NE 29-25s-12w | 8- -53 | 4238 | 4006- 4021 | Viola li; Ord. | P 186 | |
| Trego | Hixson | Pam-Kar Drilling Co.'s Hixson 1, NW NW NE 19-11s-22w | 8- -53 | 3952 | 3818- 3827 | Cgl; Miss. | P 15 | |
| | | **KANSAS—OIL FIELD EXTENSION** | | | | | | |
| Rice | IXL | Beardmore Drlg. & Isern Drlg. Co.'s Allinger 1, NW NW NW 2-19s-10w, ½ mi e extension. | 8- -53 | 3313 | 3302- 3313 | Arbuckle li; Ord. | P 25 | |
| | | **KANSAS—NEW GAS FIELD** | | | | | | |
| Pawnee | | Vickers Exploration, Ltd's Sweeney 1, NW NW NE 8-21s-15w | 8- -53 | 3818 | 3792- 3801 | Arbuckle li; Ord. | F 6.2 mln | |
| | | **KANSAS—GAS FIELD EXTENSIONS** | | | | | | |
| Morton | Hugoton Area | J. M. Huber Corp.'s Lemon 1, SW SW NE 3-32e-40w | 8- -53 | 5606 | 2308- 2370 | Krider sand | F 2.3 mln; open | |
| Seward | Liberal-Light | Lansekan Co., Inc's Wood 1, C NE SW 36-34s-32w, 2 mi ne ext. | 8- -53 | 6605 | 5103- 5115 | Lansing li; Perm. | F 3.4 mln | |
| | | **KENTUCKY—NEW OIL FIELDS** | | | | | | |
| Daviess | | Basin Drlg.-S. Yunker's Earl Mulligan 1, in 24-O-27 | 8- -53 | 2154 | 2147- 2152 | O'Hara li; Miss. | P 155 | |
| Henderson | Oak Grove, N. | The Texas Co.'s E. C. Farmer 1, NE SW SW 12-P-25 | 8- -53 | 2258 | 2244- 2256 | O'Hara li; Miss. | P 28; 23 wtr | |
| | | **SOUTH LOUISIANA—NEW OIL FIELDS** | | | | | | |
| Beauregard | Juanita Area | Houston Oil Co.'s Newport Industries, Inc. 1, in 13-5s-11 | 8-30-53 | 8000 | 7484- 7488 | | F 88; 1/8" | 46.6 |
| Beauregard | | Sunray Oil Corp.'s Longbell Lbr. Co. 2, in 10-4s-8w (OWDD) | 8-25-53 | 12884 | 12668-12696 | | F 234; 32/32" | 51.9 |
| Plaquemines | SE Black Bay Area | Gulf Refg. Co.'s Louisiana State "QQ" 195-1, in 17s-17e | 8-25-53 | 11500 | 7714- 7727 | Sd; Mio. | F 162; 8/64" | 29.4 |
| | | **SOUTH LOUISIANA— NEW OIL PAYS** | | | | | | |
| Calcasieu | Iowa Dome | Richardson & Bass' Frank C. Wait 1, in 19-9s-6w | 8-19-53 | 11512 | 10962-10972 | | F 417; 1/8" | 38.1 |
| St. Mary | Jeanerette | Kerr-McGee's Bessie 1, in 39-13s-9e, s extension | 8-19-53 | 11554 | 6930- 6962 | Sd; Mio. | F 187; 1/8" | 30.3 |
| Terrebonne | Ship Shoal-Block 72 | Magnolia's State Lease 766-B-4, Blk 87 | 8-10-53 | 12261 | 9786- 9794 | | F 568; 1/4" | 38 |
| | | **SOUTH LOUISIANA—NEW DISTILLATE FIELD** | | | | | | |
| Terrebonne | | John W. Mecom's Southdown Sugars, Inc. 1, in 84-17s-17e | 7-31-53 | 12800 | 12420-12427 | | F 47 dist; 4.5 mln; 11/64" | |
| | | **SOUTH LOUISIANA—NEW GAS PAY** | | | | | | |
| Plaquemines | Venice | John W. Mecom & Tide Water's Rectangle Ranch 2, in 36-21s-30e | 8-27-53 | 14145 | 2345- 2355 | | F 2.8 mln; ¼" | |
| | | **NORTH LOUISIANA—NEW OIL FIELDS** | | | | | | |
| Concordia | Roseland | Carter Oil Co.'s Orrin James 2, in 26-4n-9e | 8-14-53 | 7515 | 6747- 6749 | Wilcox sd; Eoc. | F 192; 8/32" | 47 |
| Tensas | Harpers Island | Heep Oil Corp. et al's Magnolia-Learned 1, in 12-10n-12e | 8-14-53 | 9288 | 9252- 9260 | Tuscalocsa sd; U. Cre. | F 166; ½" | 39.6 |

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## U. S. Discoveries—Continued

| COUNTY | FIELD | COMPANY, WELL AND LOCATION | Date Completed | Total Depth (Feet) | Completion Horizon (Feet) | [1]Name, Character and Age of Producing Formation | [2]Initial Production Method and Choke | Gravity of Oil |
|---|---|---|---|---|---|---|---|---|
| | | **NORTH LOUISIANA—OIL FIELD EXTENSION** | | | | | | |
| Claiborne | Lisbon | Union Oil Co.'s S. M. Caruthers 1, in 22-21n-5w, 2 mi w ext. | 8-10-53 | 8593 | 5112- 5127 | 3-Finger li; L. Cre. | P 65 | 31 |
| | | **NORTH LOUISIANA—NEW GAS PAY** | | | | | | |
| Bossier | Sarepta, S. | Sunray's S. H. Bolinger A-1, in 19-22n-11w | 8-15-53 | 9425 | 9162- 9170 | Stray sd; Jur. | F 200 dist; 2.2 mln; $\frac{5}{32}$" | 58.2 |
| | | **MICHIGAN—NEW OIL FIELD** | | | | | | |
| Arenac | | Jack Uhl's McFarlan 1, NE NW SW 34-20n-3e, Moffatt Twp | 8- -53 | 2988 | 2984- 2988 | Dundee li; Devo. | P 35 | |
| | | **MISSISSIPPI—NEW OIL FIELD** | | | | | | |
| Adams | Levees Creek | Jett Drlg. Co.-R. J. Bartlett's Annie T. Minter C-1, in 20-5n-1w | 8-13-53 | 6999 | 6689- 6691 | Minter sd; Eoc. | F 176; $\frac{1}{8}$" | 41 |
| | | **MISSISSIPPI—NEW GAS FIELD** | | | | | | |
| Forrest | | Southern Natural Gas Co.'s Creosote Oil Corp. 1, NW NE NE 10-1s-13w | 8-17-53 | 8668 | 8273- 8284 | Pilot sd; U. Cre. | F 1.3 mln | |
| | | **MONTANA—NEW OIL FIELD** | | | | | | |
| Carbon | | Kirk Oil Co. et al's Stow 1, NW NW SE 14-7s-22e | 8-10-53 | 6065 | 5854- 5866 | Graybull sd; L. Cre. | F 160; $\frac{3}{4}$" | 54 |
| | | **NEBRASKA—NEW OIL FIELDS** | | | | | | |
| Cheyenne | | Ginther, Warren & Ginther's Rapp 3, NE NE NW 26-14n-50w | 7-25-53 | 4929 | 4723- 4731 | Dakota "D" sd; U. Cre. | P 125 | |
| Richardson | | J. C. Higgins et al's Edna & Guy Snethen 1, SW SW NW 29-2n-14e | 1-17-53 | 3093 | 3079- 3093 | Viola li; Ord. | P 168 | |
| | | **NEBRASKA—NEW GAS FIELD** | | | | | | |
| Cheyenne | Gurley, S. | Ohio Oil Co.'s Rauner 1, NW NW SE 15-15n-49w | 8-18-53 | 4706 | 4490- 4506 | Dakota "D" sd; U. Cre. | F 0.5 mln | |
| | | **NEW MEXICO—(PERMIAN BASIN)—NEW OIL FIELDS** | | | | | | |
| Chaves | | Forest Oil Corp.'s General American Oil 1, C SE NW 7-7s-31e | 8- 4-53 | 9298 | 7774- 7870 | Wolfcamp li; Perm. | F 1023 $\frac{1}{2}$" | 42.2 |
| Lea | | Ohio Oil Co.'s Trigg-Federal 1, in 20-13s-33e | 8-28-53 | 13570 | 9590- 9718 | Permo-Penn | F 112; $\frac{13}{64}$" | 41.8 |
| | | **NEW MEXICO—(PERMIAN BASIN)—OIL FIELD EXTENSION** | | | | | | |
| Lea | Teas | W. H. Black's Federal 1, in 15-20s-33e, 1 mi w ext. | 8-10-53 | 3355 | 3292- 3355 | Yates sd; zerm; | P 86 | 34 |
| | | **NEW MEXICO—(PERMIAN BASIN)—NEW DISTILLATE PAY** | | | | | | |
| Eddy | Red Lake | Stanolind's State 1-AB, in 29-17s-28e | 8-24-53 | 12431 | 10102-10127 | Pennsylvanian | F 26 dist; 30.0 mln | 59.6 |
| | | **NEW MEXICO—(SAN JUAN BASIN)—NEW GAS FIELDS** | | | | | | |
| Rio Arriba | | Phillips' San Juan Unit (28-6) 1-14, SW NE NE 14-28n-6w | 8-24-53 | 5703 | | Mesaverde sd; U. Cre. | F 3.2 mln | |
| San Juan | | Phillips' San Juan Unit (32-7) 6-17, NE NE 17-31n-7w | 8-24-53 | 3240 | 3075- 3240 | Fruitland sd; U. Cre. | F 1.8 mln | |
| | | **NEW MEXICO—(SAN JUAN BASIN)—GAS FIELD EXTENSIONS** | | | | | | |
| Rio Arriba | Blanco | J. Glenn Turner's Lockhard 1, SW NE SW 21-29n-6w, sw ext | 8-25-53 | 5675 | 5045- 5675 | Mesaverde sd; U. Cre. | F 6.6 mln | |
| | | **NEW MEXICO—(SAN JUAN BASIN)—GAS FIELD EXTENSIONS** | | | | | | |
| Rio Arriba | | Phillips' Unit (3-24) 30-6, NE SW SW 24-30n-6w | 8-11-53 | 6038 | 5530- 6038 | Mesaverde sd; U. Cre. | F 2.6 mln | |
| | | **NORTH DAKOTA—NEW OIL FIELD** | | | | | | |
| Bottineau | | Ward-Williston Drlg. Co.'s Wm. Gorder 1, C NW NW 35-164n-80w | 8-25-53 | 3275 | 3248- 3275 | Madison li; Miss. | P 6; 1 wtr | |
| | | **OHIO—GAS FIELD EXTENSION** | | | | | | |
| Lake | Cleveland | I. C. Beck Co.'s Reynolds 1 | 8-28-53 | 3002 | 2954- 2997 | Clinton sd; Sil. | F 3.1 mln | |
| | | **OKLAHOMA—NEW OIL FIELDS** | | | | | | |
| Comanche | | Esperado Mining Co.'s Anna Dunham 1, NE NE NE 14-2n-10w | 8- -53 | 1220 | 1203- 1220 | Pennsylvania sd; Penn. | P 46 | 42 |
| Creek | | Roy G. Woods' Moore 1, NW NE NE 30-14n-9e | 8- -53 | 3865 | 3226- 3232 | Dutch sd; Penn. | P 5; 2 wtr | |
| Garfield | | Cities Service Oil Co.'s Lewis "B" 1, C NW NE 32-21n-3w | 8- -53 | 6185 | 4786- 4805 | L. Layton sd; Penn. | F 172; $\frac{3}{8}$" | 42.8 |
| Kay | | Walter Duncan's Pauline Haynes 1, NW NE NW 31-29n-2w | 8- -53 | 4613 | 4605- 4613 | Simpson sd; Ord. | F 175; $\frac{3}{16}$" | 40 |
| Kiowa | | Huffman & Malloy & Zephyr Drlg. Corp's Heiple 1, NW SE NW, 6-7n-15w | 8- -53 | 6516 | 4014- 4030 | Springer sd; Penn. | P 24 | |
| Lincoln | | Deep Rock's Tom Rowan A-1, SE SE SE 9-15n-4e | 8- -53 | 4900 | 4085- 4093 | Red Fork sd; Penn. | F 45; 3 wtr; $\frac{3}{4}$" | |
| Lincoln | | Puckett Drlg. Co.'s Harlow 1, SW NW NW 34-14n-6e | 8- -53 | 3167 | 3099- 3120 | Prue sd; Penn. | F 171; $\frac{1}{4}$" | 39 |
| McClain | | Magnolia's Gladys Love 1, SW SW 4-5n-2w | 8- -53 | 9647 | 8316- 8325 | 1st Bromide sd; Ord. | F 325 $\frac{1}{4}$" | 40 |
| Noble | | J. M. Henry & Geo Drlg. Co.'s Knolke 1, NE NE NW 7-22n-2w | 8- -53 | 1501 | 1388- 1392 | Hotson sd; Perm. | P 30 | 38 |
| Payne | | S. C. Yingling Oil's J. R. Swartz 1, NW NE NE 32-20n-2e | 8- -53 | 4733 | 4724- 4733 | Wilcox li; Ord. | F 720; $\frac{3}{16}$" | |
| Stephens | | Russell Cobb, Jr. & W. B. Davis' Martha Jane Edwards 1, SE NE NW 25-1n-4w. | 8- -53 | 4446 | 4193- 4202 | | P 90 | 22 |
| Tillman | | S. D. Johnson's J. P. Parrish 1, SW SW NW 10-3s-19w | 8- -53 | 5614 | 5515- 5537 | Arbuckle Detrital | F 80; $\frac{11}{64}$" | 40.4 |
| | | **OKLAHOMA—NEW OIL PAY** | | | | | | |
| Okfuskee | Morse, NW | R. & R. Oil Co.'s Beets 1, NE NE SE 36-13n-9e | 8- -53 | 2295 | 2102- 2112 | Red Fork sd; Penn. | P 4; 5 wtr | |
| | | **OKLAHOMA—OIL FIELD EXTENSIONS** | | | | | | |
| Lincoln | Parkland, E. | Gene Graham Drlg. Co.'s Chas. Mitchell 1, SW SE SE 18-16n-5e, 1 mi nw ext. | 8- -53 | 3601 | 3592- 3601 | Prue sd; Penn. | F 200; 40 wtr; $\frac{1}{2}$" | |
| Lincoln | Parkland, E. | Zephyr Pet. Co.'s Swigart 1, NE NW NW 32-16n-5e, $\frac{1}{2}$ mi s ext. | 8- -53 | 3537 | 3522- 3537 | Prue sd; Penn. | F 100; 1" | |
| Lincoln | Payson, E. | Puckett Drlg. Co. & W. C. McBride's Neer 1, NE SW SW 26-13n-4e, $\frac{3}{4}$ mi w ext. | 8- -53 | 4312 | 4127- 4137 | L. Skinner sd; Penn. | P 192 | 38 |
| Lincoln | | Floyd G. Hubbell's Getman 1, NW SW SW 2-15n-5e | 8- -53 | 3344 | 3254- 3264 | Oswego li; Perm. | F 85; $\frac{3}{16}$" | 51 |
| Logan | | V. A. Brill's Flynn 1, NE NE 20-5n-4w | 8- -53 | 12062 | 11122-11165 | Tulip Creek li; Ord. | F 323; $\frac{3}{16}$" | 45 |
| | | | | | 11256-11340 | McLish li; Ord. | F 320 $\frac{1}{2}$; $\frac{7}{32}$" | 46 |
| Pontotoc | Roff | Okla. Tex. Oil Co.'s Couch 1, SW NE SW 8-2n-4e, n ext. | 8- -53 | 580 | 485- 580 | | P 4 | 30 |
| | | **OKLAHOMA—NEW DISTILLATE PAY** | | | | | | |
| Logan | Navina, SW | MacMillan et al's Krout 2, SW NE SW 14-15n-4w | 8- -53 | 6570 | 5114- 5117 | Layton sd; Penn. | F 71 dist; 2.7 mln; $\frac{3}{8}$" | 61 |
| | | **OKLAHOMA—NEW GAS FIELD** | | | | | | |
| Lincoln | | Ben J. Taylor's Cook Heirs 1, SE NW NW 25-14n-6e | 8- -53 | 2943 | 2916- 2943 | Prue sd; Penn. | 1.5 mln | |
| | | **TEXAS—DISTRICT 1 (SOUTH CENTRAL)—NEW OIL FIELDS** | | | | | | |
| Atascosa | Kyote | Geo. Parker's R. V. Davis 1, BS&F Sur. 1607, 1 mi ne ext. | 8- 6-53 | 3527 | 3504- 3527 | Navarro sd; U. Cre. | P 23 | 38.2 |
| Caldwell | | Ellmag Oil Corp.'s Frankie Reed et al 1, Solomon Sur. | 4-28-53 | 2735 | 2460- 2510 | Austin Ch; U. Cre. | F 29 | 35 |
| Frio | | R. B. Wherry & C. A. Green's W. E. Dickerson 1, J. Poitevent Sur. No. 1379 | 8-15-53 | 3259 | 3240- 3259 | Navarro sd; U. Cre. | F 42; open | 39.1 |
| | | **TEXAS—DISTRICT 1 (SOUTH CENTRAL)—NEW GAS PAY** | | | | | | |
| McMullen | Green Branch | Alaska SS Co. & Newman Bros. Drlg. Co.'s Syndicate A-7, J. Fitzpatrick Sur. No. 20 (OWDD). | 7-24-53 | 6199 | 5477- 5484 | Wilcox sd; Eoc. | F 15.0 mln; open | 60 |
| | | **TEXAS—DISTRICT 2 (MIDDLE GULF)—NEW OIL FIELD** | | | | | | |
| Refugio | | Sam E. Wilson, Jr.'s Jamie Hynes F-6, John Malone Sur. | 8- 1-53 | 8055 | 5702- 5706 | Frio sd; Olig. | F 131; $\frac{7}{64}$" | 37.4 |
| | | **TEXAS—DISTRICT 2 (MIDDLE GULF)—NEW OIL PAY** | | | | | | |
| Live Oak | Mt. Lucas, E. | B. F. Ussery Drlg. Co.'s Holman Cartwright 1, F. Botillo Sur. | 8- 2-53 | 4075 | 3724- 3730 | L. Vicksburg sd; Olig. | F 74; $\frac{8}{64}$" | 24.5 |
| | | **TEXAS—DISTRICT 2 (MIDDLE GULF)—OIL FIELD EXTENSION** | | | | | | |
| Bee | Caesar, S. | Midstates Oil Corp.'s A. N. Dahl 1, J. Cunningham Sur., $\frac{1}{2}$ mi se ext. | 8- 4-53 | 7503 | 6702- 6712 | Slick sd; Eoc. | F 42; $\frac{7}{64}$" | 40.2 |
| | | **TEXAS—DISTRICT 2 (MIDDLE GULF)—NEW DISTILLATE FIELD** | | | | | | |
| Refugio | Refugio, E. | J & C Drlg. Co.'s Shelton 1, Refugio Town Tr. (OWWO) | 7-28-53 | 6462 | 6294- 6297 | | F 485 dist; 21.5 mln; open | 60.0 |
| | | **TEXAS—DISTRICT 2 (MIDDLE GULF)—NEW DISTILLATE PAYS** | | | | | | |
| Goliad | Gladys Powell | Frank W. Michaux's Kauffman Est 3, John P. Borden Sur. | 7-22-53 | 7665 | 7648- 7653 | Mackhank sd; Eoc. | F dist; 6.5 mln | 66 |
| Live Oak | Clayton | Houston Oil Co. et al's W. N. Skaggs et al Unit 1-1, Sect 84, C. F. Simmons Subd. | 8- 5-53 | 7930 | 6455- 6465 | Slick sd; Eoc. | F 24 dist; 6.0 mln | |
| | | **TEXAS—DISTRICT 2 (MIDDLE GULF)—NEW GAS FIELDS** | | | | | | |
| Calhoun | | Lamar Hunt Trust Est.'s State Tr. 59-1, San Antonio Bay Tr 59 | 8-10-53 | 10561 | 10532-10542 | | F 0.9 mln | |
| De Witt | | Robert Mosbacher's Herbert Zengerle 1, Charles Lockhart Sur. | 8-11-53 | 7852 | 7780- 7816 | Wilcox sd; Eoc. | F 12.8 mln | |
| Victoria | | Lonnie Glasscock's William A. Reuter 1, Felipe Dimmitt Sur. | 8- 6-53 | 5612 | 2341- 2470 | | F 6.0 mln | |
| | | | | | 2464- 2470 | Oakville sd; Mio. | F 10.0 mln | |
| | | **TEXAS—DISTRICT 2 (MIDDLE GULF)—NEW GAS PAY** | | | | | | |
| Lavaca | Hope, E. | Paul J. Fly's McKinley Jacobs et al 1, Phillip Smith Sur. | 8-23-53 | 4755 | 1270- 1277 | | F 1.9 mln | 60 |
| | | **TEXAS—DISTRICT 3 (UPPER GULF)—NEW OIL FIELDS** | | | | | | |
| Brazoria | Stratton Ridge, S. | A. S. Bowers 1, J. Grace Sur. | 8- 5-53 | 6574 | 5568- 5588 | L. Miocene sd; Mic. | F 108; $\frac{7}{64}$" | 22.8 |
| Hardin | Saratoga, W. | Michel T. Halbouty's Hooks & Graham 1, Epsey Hart Sur. | 8-17-53 | 6713 | 5821- 5890 | Yegua (EY-6) sd; Eoc. | F 125; $\frac{3}{64}$" | 35 |
| Harris | | Texas State Drlg. Co.'s Joe W. Kosina 1, Thomas Toby Sur. | 8- 1-53 | 9048 | 8300- 8303 | Yegua sd; Eoc. | F 87; $\frac{8}{64}$" | 35.8 |
| Walker | | Chambers Drlg., C. B. Davis & N. C. Hurd's Gibbs Bros. 1, Elizah Anderson Sur. | 8- 3-53 | 5335 | 4563- 4566 | Wilcox sd; Eoc. | P 74 | 42.6 |
| | | **TEXAS—DISTRICT 3 (UPPER GULF)—NEW OIL PAY** | | | | | | |
| Tyler | East Hillister | C. N. Housh's Rice Institute C-4, C. E. Stewart Sur. | 8- 9-53 | 5042 | 4769- 4770 | A-2 sd; Eoc. | F 112; $\frac{5}{32}$" | 38.2 |
| | | **TEXAS—DISTRICT 3 (UPPER GULF)—OIL FIELD EXTENSION** | | | | | | |
| Harris | Kuhlman | Harrell Oil et al's Mrs. Emma Helberg 1, J. Reinerman Sur., $\frac{1}{2}$ mi e ext. | 8-10-53 | 6127 | 5838- 5848 | Yegua sd; Eoc. | F 115; $\frac{3}{64}$" | 38 |
| | | **TEXAS—DISTRICT 3 (UPPER GULF)—NEW DISTILLATE PAYS** | | | | | | |
| Jefferson | Big Hill, W. | Adams & Haggarty's Fee 6-H, T&NO RR Co. Sur., Sect. 174 | 8-29-53 | 10036 | 9635- 9660 | 1st Hackberry sd; Olig. | Not gauged | |
| Orange | Echo | Richard M. Wright's Q. A. Sikes 1, Theron Strong Sur. | 7-30-53 | 9200 | 8408- 8416 | Frio sd; Olig. | F dist; 15.0 mln | |

# NEW, Power-Packed AND READY TO GO!

**NEW** U-1091 natural gas power unit develops 187 net h.p. at 1400 rated r.p.m.; 200 net h.p. at 1600 max. r.p.m.; maximum torque, 820 lbs. ft. @ 800 r.p.m.

**NEW** U-450—102 net horsepower at 1800 rated r.p.m.; 110 @ 2200 r.p.m.; maximum torque, 324 lbs. ft. @ 1200 r.p.m.

**NEW** U-406—91 net horsepower at 1800 rated r.p.m.; 98 @ 2200 r.p.m.; maximum torque, 279 lbs. ft. @ 1200 r.p.m.

**NEW** U-372—83 net horsepower at 1800 rated r.p.m.; 91.5 @ 2200 r.p.m.; maximum torque, 263 lbs. ft. @ 1200 r.p.m.

**NEW** U-269—62 net horsepower at 1800 rated r.p.m.; 72 @ 2400 r.p.m.; maximum torque, 191 lbs. ft. @ 1200 r.p.m.

**NEW** U-240—55 net horsepower at 1800 rated r.p.m.; 64 @ 2400 r.p.m.; maximum torque, 168 lbs. ft. @ 1200 r.p.m.

**NEW** U-220—50.5 net horsepower at 1800 rated r.p.m; 62 @ 2400 r.p.m.; maximum torque, 151 lbs. ft. @ 1200 r.p.m.

## IH Announces Seven New International Engines

Seven new six-cylinder, carbureted, valve-in-head engines have been added to the International line, which now includes 18 models—diesel, gasoline or gas—ranging from 16.5 to 200 net horsepower.

These new models are the result of more than 45 years of IH engineering and manufacturing experience building a complete line of heavy duty engines for tractors, trucks, construction and oil field equipment and individual power unit applications.

These new units have the durability, flexibility and economy to meet your requirements for lower cost performance. The unmatched network of IH district offices, parts depots, distributors and dealers puts complete service facilities practically at your door.

If you are an individual user of engines, it will pay you to see your nearest International Industrial Distributor or Power Unit Dealer for more complete information. If you are a manufacturer, your nearest IH district office will be glad to help you engineer these engines into the equipment you are building.

**INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILL.**

**POWER THAT PAYS** — **INTERNATIONAL**

| COUNTY | FIELD | COMPANY, WELL AND LOCATION | Date Completed | Total Depth (Feet) | Completion Horizon (Feet) | [1]Name, Character and Age of Producing Formation | [2]Initial Production Method and Choke | Gravity of Oil |
|---|---|---|---|---|---|---|---|---|
| | | **TEXAS—DISTRICT 3 (UPPER GULF)—DISTILLATE FIELD EXTENSIONS** | | | | | | |
| Chambers | Red Fish Reef | Humble's Galveston Bay State A-55, Sect. 204, ½ mi ne ext. | 8-16-53 | 9900 | 9536- 9561 | Frio sd; Olig. | F 310 dist; 26.6 mln | 49.1 |
| Madison | Madisonville | Group Oil Co.'s R. A. & W. G. Johnston 1, Amy Boatwright Sur., ½ mi nw ext | 7-24-53 | 9850 | 9114- 9195 | Woodbine Dexter sd; U. Cre. | F 15.2 mln | 52.3 |
| | | **TEXAS—DISTRICT 3 (UPPER GULF)—NEW GAS FIELD** | | | | | | |
| Brazoria | Velasco Area | The Dow Chemical Co.'s Fee 1, Maurice Henry Sur. | 7-23-53 | 7209 | 7002- 7006 | Miocene sd; Mio. | F 33.0 mln | .... |
| | | **TEXAS—DISTRICT 3 (UPPER GULF)—GAS FIELD EXTENSIONS** | | | | | | |
| Liberty | Pelican | Natural Gas & Oil Corp.'s Wirt Davis Est. 2, Wm. Keaghey Sur, ½ mi sw ext. | 7-25-53 | 8893 | 8794- 8800 | Wilcox sd; Eoc. | Not gauged | .... |
| Wharton | East Bernard | Tide Water's F. J. Vacek 1, John F. Stevenson Sur., 1½ mi sw ext. | 7-30-53 | 7847 | 7520- 7530 | Boetcher sd; Eoc. | F 110 wtr; 0.8 mln; 4/64" | .... |
| | | **TEXAS—DISTRICT 4 (LOWER GULF-S.W.)—NEW OIL FIELDS** | | | | | | |
| Duval | ..... | The Texas Co.'s D.C.R.C. NCT-56 B-1, GC&SFRR Sur., Sect. 259 | 8- 3-53 | 2711 | 1833- 1844 | Hockley sd; Eoc. | P 20 | 20 |
| Jim Hogg | Hebbronville, S. | H. L. Hunt's Silver Lake Ranches, Inc. 1, Noriecitas Simon de Ynojosa Gr., Fowler-Rankin Subd., Sect. 12. | 8-16-53 | 4247 | 4235- 4238 | ..... | F 47; 4/64" | 46.8 |
| Jim Wells | ..... | W. Earl Rowe's R. V. Embleton B-2, La Tinaja de Lara Sur., Welhausen & Driscoll Subd., Blk. 4. | 8- 1-53 | 5328 | 5296- 5299 | Frio-Vicks sd; Olig. | F 139; 1/8" | 42.1 |
| San Patricio | North Pasture | Plymouth's R. H. Welder 1-2, M. J. de la Garza South Trap | 8-15-53 | 7868 | 7320- 7324<br>7659- 7662 | ..... | F 128; 4/64" | 45.2 |
| Starr | Marks Area | C. G. Glasscock's Amelia R. Canales 1, El Javali Gr., Sh 2, Tr. 8 | 8- 6-53 | 2100 | 1884- 1891 | O'Hern sd; Eoc. | P 45 | 27 |
| Starr | Strong | Corpus Christi Refg. Co.'s Trevino 1, Sur. 193, Blk. 3 | 8-11-53 | 5308 | 4685- 4705 | ..... | F 143; 4/64" | 46.2 |
| Starr | North El Tanque | Bass & Vessels' Milton J. Baird, et al 2, Por. 84, Tr. 48 | 8- 1-53 | 1928 | 1922- 1927 | Baird (Frio) sd; Olig. | F 38; 4/32 | 26.3 |
| Starr | Theljon | John J. Pichinson & Thelma D. Parr's Ida L. Davis 1, Por. 81, Sh. 78, Lot 5 | 6-22-53 | 1457 | 1452- 1457 | ..... | P 30 | 21.0 |
| Webb | Kirkpatrick | The Texas Co.'s O. G. Kirkpatrick NCT-1-15, W. W. Griffin Sur. | 8- 6-53 | 2286 | 1854- 1868 | Rosenberg sd; Eoc. | P 10 | 45 |
| | | **TEXAS—DISTRICT 4 (LOWER GULF-S.W.)—NEW OIL PAYS** | | | | | | |
| Brooks | Kelsey-Deep | Humble's McGill Bros. A/C 2-194, La Blanca Gr. | 8-16-53 | 7800 | 7135- 7143 | (Jackson) Zone 26-A sd; Eoc. | F 97; 1/8" | 41.0 |
| Jim Wells | Seeligson | W. A. Richardson et al's Breen-Horsting "B" Unit 3-B, R. P. Haldeman Subd., Sect. 49 | 8- 1-53 | 6689 | 6487- 6498 | (20-F-SW) Frio-Vicks sd; Olig. | F 143; P-37" | 45 |
| Nueces | Agua Dulce, N. | Puenticitas Oil Co.'s S. & H. D. Countiss 1, Part. of W. W. Wright Lds., Sh. 3 | 8- 3-53 | 7466 | 6338- 6340 | Dixon sd; Olig | F 127; 4/64" | 41 |
| Nueces | Cayo Del Oso | Southwestern O&R Co.'s Orville W. Eastland 1, Flour Bluff &Encinal Fm. Tr., Sect. 32, Lot. 20. | 7-16-53 | 6670 | 6649- 6651 | ..... | F 143; 4/32" | 42 |
| Starr | El Benadito | Magnolia's N. T. Neblett 4, El Benadito Gr., Sh. 4, Lot E, Subd. "B" | 8- 8-53 | 9000 | 5901- 5905 | ..... | F 107; 1/8" | 36.7 |
| Starr | Rincon, N. | Sun's Mateo Saenz-State 11, Santos Bazan Sur. 80 | 8-12-53 | 6500 | 6061- 6071 | Rincon sd; Olig. | F 144; 1/8" | 42.7 |
| | | **TEXAS—DISTRICT 4 (LOWER GULF-S.W.)—NEW DISTILLATE FIELDS** | | | | | | |
| Kenedy | Murdock Pass | Sun's Dunn McCampbell 4, J. S. Boyles Sur., Padre Island, 2/3 mi ext. | 8- 4-53 | 7399 | 7260- 7275 | Marginulina sd; Olig. | F 48 dist; 12.0 mln | 48 |
| Nueces | Robstown, S. | Southwestern's J. S. Ruegg et al 1, George H. Paul Subd. | 6-13-53 | 7470 | 5603- 5606 | Frio 5600' sd; Olig. | F 110 dist; 22.0 mln | 56 |
| | | | | | 6904- 6907 | 6900' sd; Olig. | F 96 dist; 80.0 mln | 59.2 |
| | | **TEXAS—DISTRICT 4 (LOWER GULF-S.W.)—NEW DISTILLATE PAYS** | | | | | | |
| Duval | Atlee | H. R. Smith, et al's Geo. Herberger 1, Santos Flores Gr., Sect. 14, Ball Ranch Subd. | 7-12-53 | 5833 | 5779- 5789 | Hiawatha sd; Eoc. | F 107 dist; 4.1 mln | 63.3 |
| San Patricio | Mathis, E. | Skelly's Freda Person 1, G. H. Paul Subd. of Welder Ranch, Sect. 28 | 7-25-53 | 5779 | 4750- 4756 | La Rosa sd; Olig. | F 43 dist; 6.4 mln | 55.5 |
| | | **TEXAS—DISTRICT 4 (LOWER GULF-S.W.)—GAS FIELD EXTENSION** | | | | | | |
| San Patricio | Mathis, E. | Skelly's Fannie Coats 1, G. H. Paul Subd. of Welder Ranch, Sect. 28, ½ mi se ext. | 8-24-53 | 4904 | 4434- 4440 | Sinton sd; Olig. | F 13.0 mln | .... |
| | | **TEXAS—DISTRICT 6 (NORTHEAST)—NEW OIL FIELD** | | | | | | |
| Red River | ..... | Seabcard Oil Co.'s Coline 1, Igenio Tejada Sur. | 8-15-53 | 7500 | 4920- 4926 | Travis Peak sd; L. Cre. | P 155 | 37 |
| | | **TEXAS—DISTRICT 6 (NORTHEAST)—NEW OIL PAY** | | | | | | |
| Houston | Ft. Trinidad | Woodley Pet. & Moran Corp.'s W. T. Bruton Est. 2, Barton Clark Sur., (OWWO) | 8-21-53 | 9166 | 8690- 8712 | Dexter sd; U. Cre. | F 214; 4/64" | 37.5 |
| | | **TEXAS—DISTRICT 6 (NORTHEAST)—OIL FIELD EXTENSION** | | | | | | |
| Marion | Woodlawn | L. A. Grelling, B. G. Byars & C. C. Coulston's J. C. Murphy 1, N. M. Ricker Sur., 2 mi n ext. | 8- 6-53 | 6712 | 6642- 6662 | Pettit li; L. Cre. | F 565; 1/4" | 43 |
| | | **TEXAS—DISTRICT 7-C (WEST CENTRAL)—NEW OIL FIELDS** | | | | | | |
| Runnels | ..... | Sojourner Drlg. Co.'s J. P. McCord 1, Sect. 126, A. S. Clayton Sur. | 8- 2-53 | 3905 | 3715- 3719 | U. Gardner sd; Penn. | F 195; 4/64" | 40 |
| Sutton | ..... | Ashland O&R Co.'s W. D. Wallace Est. 1, Sect. 67, Blk. 14, TW&NG Sur. | 8-24-53 | 6650 | 5006- 5026 | Strawn Reef li; Penn. | F 87; 4/16" | 34.2 |
| | | **TEXAS—DISTRICT 7-C (WEST CENTRAL)—NEW OIL PAY** | | | | | | |
| Runnels | Ballinger | J. K. Anderson's Nunn Est. 1, Sect. 100, Wellett Holmes Sur. | 8-22-53 | 2417 | 2410- 2417 | Serratt sd; Penn. | F 352; 1/4" | 47 |
| | | **TEXAS—DISTRICT 7-C (WEST CENTRAL)—OIL FIELD EXTENSIONS** | | | | | | |
| Runnels | Hull-Dobbs, E. | Ohio Oil Co.'s W. D. Burford 1, G. W. Denton Sur 468, ½ mi n ext. | 8- 7-53 | 3979 | 3932- 3949 | L. Gardner sd; Penn. | F 323; 1/4" | 37 |
| Upton | ..... | Gulf's McElroy Ranch State 2, Sect. 182, Blk E, CCSD&RGNG Sur., 1 mi ne ext. | 8-19-53 | 10629 | 10040-10562 | Devonian li; Dev. | F 574; 3/4" | 48.4 |
| | | **TEXAS—DISTRICT 7-C (WEST CENTRAL)—NEW GAS FIELDS** | | | | | | |
| Crockett | ..... | Sun's Myrtle Mitchell 1-X, Sect. 111, Blk. 1, I&GN Sur. | 6-15-53 | 14958 | 13808-14407 | Ellenburger dolo; Ord. | F 4.3 mln; open | .... |
| Schleicher | ..... | C. L. Norsworthy, Jr.'s Virgil J. Powell 1-A, Sect. 24, Blk. A, AB&M Sur. | 8-21-53 | 5129 | 4556- 4572 | Strawn li; Penn. | F 0.2 mln; 1/4" | 39 |
| | | **TEXAS—DISTRICT 8 (WEST)—NEW OIL FIELDS** | | | | | | |
| Andrews | ..... | Stanolind & Anderson-Prichard's Midland Farms "AE" 1, Sect. 45, Blk. 41, T-2-N, G&MMB&A Sur. | 8- 4-53 | 12955 | 4795- 4830 | Grayburg dolo; Perm. | P 158; 8 wtr | 23 |
| Howard | ..... | Oceanic Oil & Green & McSpadden's Winans 1, Sect. 25, Blk. 33, T-3-N, T&P Sur. | 8-10-53 | 8195 | 8140- 8195 | Reef li; Perm. | F 1764; 3/4" | 42.3 |
| Midland | ..... | Magnolia's Ida Mae Oldham 1, Sect. 38, Blk. 37, T-1-S, T&P Sur. | 8-18-53 | 10589 | 10239-10400 | Strawn sd; Penn. | P 130; 91 wtr | 43.6 |
| Mitchell | ..... | Humble's Maude Farmer et al 1, Sect. 14, Blk. 29, T-1-S, T&P Sur. | 8-25-53 | 3477 | 2512- 2563 | Clearfork li; Perm. | P 15 | 26.6 |
| Pecos | ..... | Schermerhorn Oil Corp.'s Montague 1, Sect. 106½, Blk. OW | 8-14-53 | 3110 | 3065- 3100 | Yates sd; Perm. | P 104 | 27 |
| Yoakum | ..... | Skelly's Alton Webb 1, Sect. 475, Blk. D, J. H. Gibson Sur. | 8- 6-53 | 11890 | 5165- 5198<br>5224- 5244 | San Andres li; Perm. | F 249; 5 wtr; 3/8" | 33.8 |
| | | **TEXAS—DISTRICT 8 (WEST)—NEW OIL PAYS** | | | | | | |
| Andrews | Emma | Huskey's Emma Cowden 1, Sect. 1, Blk 44, T-2-N, T&P Sur. (OWDD) | 8-21-53 | 5416 | 5355- 5416 | Glorietta li; Perm. | F 142; 3/4" | 38.5 |
| Ector | Headlee | Texas Gulf's Headlee 4, Sect. 8, Blk. 41, T-2-S, T&P Sur | 8-14-53 | 11888 | 11756-11842 | Devonian li; Dev. | F 390; 1/4" | 49.1 |
| Garza | PHD | Clifton Thomas et al's Honolulu-Sims 1, Sect. 1282, BS&F Sur. | 8-11-53 | 3530 | 3497- 3507 | San Andres li; Perm. | P 144 | 36 |
| | | **TEXAS—DISTRICT 8 (WEST)—OIL FIELD EXTENSIONS** | | | | | | |
| Andrews | Prichard-Devonian | Continental's University 1-1, Sect. 1, Blk. 8, Univ. Lds. Sur., ⅞ mi sw ext. | 8-21-53 | 12636 | 12432-12575 | Devonian li; Dev. | F 1170; 3/4" | 44.5 |
| Andrews | Prichard-Devonian | Continental's University 49-1, Sect. 49, Blk. 6, Univ. Lds. Sur., ½ mi ne ext. | 8-21-53 | 12617 | 12456-12524 | Devonian li; Dev. | FF 438; 3/4" | 44.5 |
| Dawson | Cedar Lake, SE | R. R. Herrell & J. C. Williamson's Smart 1, Sect. 11, Blk. M, EL&RR Sur., 3/5 mi ne ext. | 8-19-53 | 4988 | 4912- 4988 | San Andres li; Perm. | P 97 | 36 |
| Dawson | Cedar Lake, SE | Texas Crude Co.'s Lindsey Tr. 1-122, Sect. 122, Blk M, EL&RR Sur., ½ mi nw ext. | 8-20-53 | 4940 | 4874- 4940 | San Andres li; Perm. | P 40; 17 wtr | 35 |
| | | **TEXAS—DISTRICT 8 (WEST)—NEW GAS FIELD** | | | | | | |
| Ward | ..... | Continental's Cynthia Monroe 1, Sect. 35, Blk. 33, H&TC Sur. | 6- 9-53 | 5688 | 4835- 4848 | Delaware sd; Perm. | F 1.8 mln | .... |
| | | **UTAH—NEW GAS FIELD** | | | | | | |
| Emery | ..... | Paul B. English & Byrd-Frost's Rath 1-A, SE SW 18:26s-7e | 8- 3-53 | 2753 | 2550- 2735 | Sinbad li; Tri. | F 5.3 mln | .... |
| | | **WYOMING—NEW OIL FIELD** | | | | | | |
| Weston | Hampshire Area | W. W. Flenniken's Hammod-Gaskill 1, NE BW SE 14-41n-66w | 8-18-53 | 7150 | 7036- 7051 | Newcastle li; U. Cre. | F 1500; 1/2" | .... |
| | | **WYOMING—NEW GAS FIELDS** | | | | | | |
| Carbon | ..... | Roden, Darden & McRae's Federal 1, SE NE SW 6-20n-77w | 8- 1-53 | 5736 | 1475- 1506 | Shannon sd; U. Cre. | F 3.0 mln | .... |
| Natrona | Big Piney Area | Continental's Gov't 1, NE NE 32-30n-113w | 8-26-53 | 4935 | 2288- 2824 | Almy sd; Eoc. | F 0.1 mln | .... |

[1] Character of producing formations abbreviated thus: Ch, Chalk; dolo, dolomite; li, limestone; sd, sandstone; sh, shale; ser, serpentine; cgl, conglomerate. Ages of formations abbreviated thus: Plio, Pliocene; Mio, Miocene; Olig, Oligocene; Eoc, Eocene; U. Cre, Upper Cretaceous; L. Cre, Lower Cretaceous; Jur, Jurassic; Tri, Triassic; Perm, Permian; Penn, Pennsylvanian; U. Miss, Upper Mississippian; L. Miss, Lower Mississippian; Devo, Devonian; Sil, Silurian; Ord, Ordovician; Cam, Cambrian.

[2] Barrels of oil per day (24 hour rate), flowing (F), pumping (P), swabbing (SW), or bailing (B); or million cubic feet of gas daily open flow capacity; size of choke in inches.

Fig. 1—Two rubber stabilizers in the drill collar string on a rig near Crane, Texas.

# Rubber Stabilizers Are Solving Permian Problems

**By controlling the manner weight is applied, straighter holes are being drilled and the danger of twist-offs is minimized.**

**By WILLIAM S. BACHMAN,** Drilco Oil Tools, Inc., of Midland, Texas.

THE TREND in West Texas drilling continues to be towards running more weight on the bit. To some contractors this means using larger outside diameter drill collars; to others it means running a greater number of conventional drill collars. But in either case, the penetration rates continue to increase in the hard rock country.

It is interesting to note that the thinking today is shifting from the idea that only the bit is involved in making more hole. Operators are thinking of the drilling tool as the entire lower end of the drilling string. The bit's capacity to make fast, as well as straight, hole is dependent upon how these heavier loads of the drill collars are applied to the bit.

It follows then that stabilizers have become increasingly important in West Texas drilling operations because the primary purpose of stabilizers is an attempt to control the manner in which the drill collar weight is applied to the bit.

**Drill Collar Stabilizer Development.** The first stabilizers used in drilling oil wells were of two types, (1) blade, and (2) reamers with smooth rollers. The API Drilling Practices Committee in 1929 discussed the latter method of using smooth rollers in detail at their annual meeting in Chicago.[1] Since that early date, a number of stabilizing tools have been tried in West Texas,[2] with the new sleeve type stabilizers rapidly gaining recognition. Essentially, a sleeve type stabilizer may be classified as a non-rotating sleeve which centers the rotating drill collar in the hole in a manner similar to a drill bushing in machine shop practices.

The use of rubber for these sleeve type stabilizers is rapidly gaining importance. One type of rubber stabilizer is shown in Figure 2.

**Why Use Rubber Stabilizers?** There are several advantages in using rubber for stabilizers.

- Rubber resists wear in abrasive formations thus giving longer stabilizer life.
- Sleeves can be run full gauge of bit to provide maximum centering of drill collars.
- Outer rubber is easily cut off drilling string in case of "washover."
- Rubber inner bearing wear on sub or drill collar surface is not excessive.
- Simplified sleeve construction eliminates many pieces that could be lost in hole.
- Non-rotating sleeve has no tendency to ream or enlarge hole which might reduce effectiveness of centering drill collars in hole.

The rubber sleeve type stabilizers available today are essentially a medium hard synthetic rubber bonded to a section of mild steel tubing 15 to 20 inches long. The number of rub-

ber ribs may vary from 6 to 12; however, the restriction to mud flow through the ribs is less than through the inside diameter of the same length of 4½-inch drill pipe. In case it is necessary to "washover" a stuck drilling string with a rotary shoe and wash pipe, a one-way locking ring is provided on one type of rubber stabilizer to engage notches in the metal inner sleeve of the stabilizer to stop rotation. See Figure 3. This locking device freezes the sleeve to the drill collar in order that the rubber may be readily cut off. However, laboratory tests have shown that on all types of rubber stabilizers, the rubber ribs could be sheared off the steel tube if necessary in a tight hole with pulling loads well within the range of all the rigs on which the sleeves are normally used.

Limes, dolomites, and the other harder formations generally provide full gauge holes where the performance of the sleeves is best. In West Texas and New Mexico from the top of the Permian lime, usually 2000 feet to 4000 feet deep through the Pennsylvanian and Mississippian to the top of the Woodford Shale, 9000 feet to 11,000 feet, the sleeves have been used extensively. An exception to this is the Abo shale of the lower Permian in New Mexico. Like the Woodford, the Abo is likely to produce excessive cavings in the hole and these chunks of hard shale cut the sleeves badly.

Below the Woodford, some of the sharper sections of Devonian Chert also tend to cut the rubber to some degree, but below the Devonian the performance is very good. The sleeves have been run into the Ellenburger or to a total depth of over 13,000 feet.

The real success of the tool should be attributed to the fluted rubber inner bearing of the stabilizer sleeve shown in Figure 4. After 600 rotating hours in the hole, this inner rubber bearing showed only about 1/16 to 3/32-inch wear on the inside sleeve diameter. The problem of wear is concerned more with the outer ribs rubbing against the wall of the hole and in a tight hole the upper end of the sleeves wearing against the top ring or the upper shoulder of the stabilizer body.

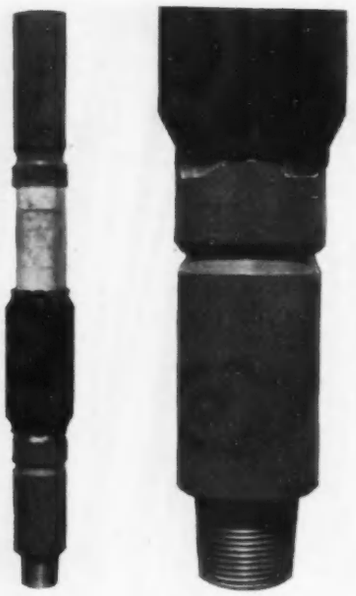


**Fig. 2** (Left)—Rubber stabilizer complete with two-piece body. Stabilizer sleeve remains stationary in hole while drill collars rotate. Worn sleeve is replaced by breaking drill collar joint just above sleeve.

**Fig. 3** (Right)—One-way lower shrink ring locking device on stabilizer body which engages notches in stabilizer inner steel sleeve to "freeze" stabilizer sleeve to drill collars in case of wash-over.

**Fig. 4**—Rubber stabilizer fluted inner bearing. This rubber bearing provides excellent self cleaning and lubricating surfaces which protect drill collar from excessive wear.

**TABLE 1**

**Distance in feet above bit to point of contact between wall of hole and drill collars for 3° inclined hole.**

| Hole Size | O.D. Drill Collars | WEIGHT ON BIT—POUNDS | | | | |
|---|---|---|---|---|---|---|
| | | 10,000 | 20,000 | 30,000 | 40,000 | 50,000 |
| 8¾"..... | 8" | 42′ | | 41′ | | 40′ |
| | 7" | 53′ | | 49′ | | 47′ |
| | 6¼" | 54′ | | 48′ | | 45′ |
| 7⅞"..... | 7" | 44′ | | | 41′ | |
| | 6" | 49′ | | | 42′ | |
| 6¾"..... | 6" | 40′ | | 37′ | | |
| | 5¼" | 43′ | | 38′ | | |

## How Rubber Stabilizers Have Been Run.

1. Single Stabilizers Run in Lower End of Drill Collar String.

The first experiences with stabilizers were attempts to drill through crooked sections with more weight. This resulted in running one or more single stabilizers in the string. In the past, the position of these single stabilizers has been determined by trying first one position then another until there was some tendency for the hole to straighten up. This "cut and try" method is tempered somewhat by experience of the operator in a given area.

Analyzing this practice, another fact has become apparent. In order to change the drift tendency, a change in the characteristics of the lower end of the drill collar string by moving the stabilizer in the string has proved helpful. Practices in the Rocky Mountains seem to indicate changes of types of bits are also helpful in changing the deviating characteristics of the lower end of the drilling string.[3]

Fortunately today, through the efforts of the API Mid-Continent Study Committee on Bore-Hole Drift, a better "educated guess" may be made on the placement of single string stabilizers by the use of calculations and graphs published in a recent paper by Lubinski and Woods.[4]

First it should be pointed out that for all inclined holes (usually over 1 degree) the drill collars will lie on the low side of the hole. Knowing this fact, then, the primary purpose of the single stabilizer would be to raise higher above the bit, the point at which the drill collar touches the wall of the hole to increase the pendulum or "plum-bob" effect of the bottom drill collars. By lifting the drill collars off the low side of the hole farther from the bit, the component of the weight of the lower collars trying to swing the bottom collars toward vertical would be greater and thus impart a greater side-cutting or hole-straightening force to the bit.

Table 1 gives distances above the bit the drill collars will touch the low side of the hole for typical West Texas hole sizes and drilling weights. The figures are approximate and were compiled from the Lubinski and Woods paper for a hole which is

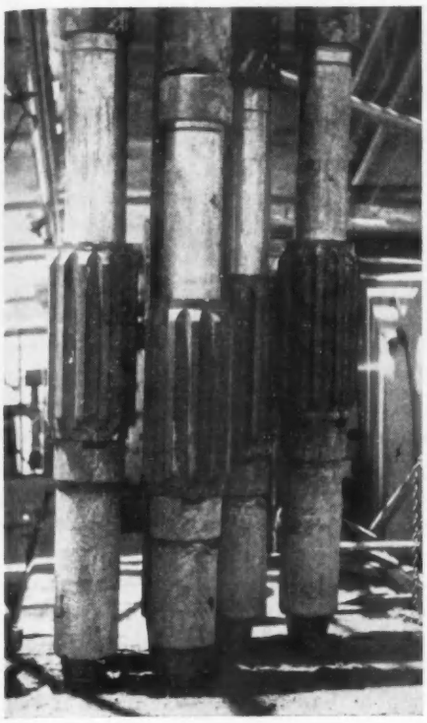


Fig. 5—Four of nine rubber stabilizers run in a string of 27 drill collars in well near Crane, Texas. Stabilizers were placed at top of every third drill collar starting one collar above bit.

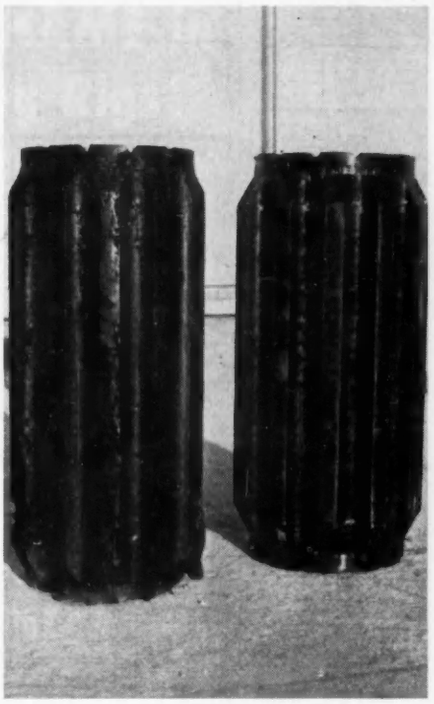


Fig. 6—Worn stabilizer sleeve from a string of nine run more than 80 trips into the hole or more than 600 rotating hours. New sleeve on right for comparison.

straight but inclined to the vertical 3 degrees.

Analyzing this table, it is interesting to make a few observations. As more weight is applied the tangent or contact between collars and wall of hole moves closer to the bit. For 50,000 pounds weight in 8¾-inch hole the tangent point is 40 feet for 8-inch collars compared to 45 feet for 6¼-inch collars. This is interesting because it shows a much greater resistance to bending in the 8-inch collars than the 6¼-inch collars as there is only ⅜-inch radial wall clearance on the 8-inch collars as compared to 1¼-inch wall clearance on the 6¼-inch collars.

Comparing 7-inch and 6-inch collars in 7⅞-inch hole, the wall contact point is about the same for both sizes of collars for 40,000 pound bit weight. The same is true for 6-inch and 5¼-inch collars in 6¾-inch hole with 30,000 pounds weight.

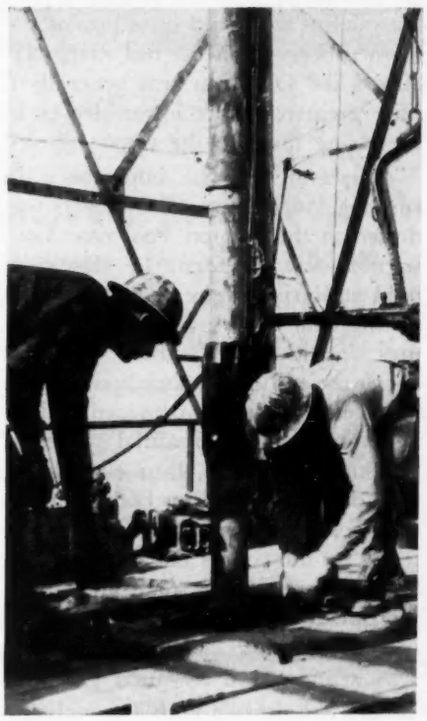
Using this table as a guide for placing single stabilizers in the string, a reasonable distance above the bit to run the stabilizer would be the top of the second drill collar or 60 feet. This should raise the collars off the low side of a 3-degree hole about 10 feet to 15 feet above the normal tangency point. For lighter weights where the contact point would be higher in the hole, a stabilizer at the top of the third collar, or 90 feet would tend to increase the pendulum or "plumb-bob" effect of the collars below the stabilizer.

A number of presently unknown factors also enter the problem such as the effect of rotation and the exact direction of the collars due to the continuous beam effect of the drill collars bending over the fulcrum point of the stabilizer. Other factors such as ledges in the hole also will alter the side cutting force on the bit but the Lubinski and Woods paper has provided a logical starting point for more study and field experimentation.

To better isolate the bottom of the collar string several operators have been successfully using two single stabilizers, one at 60 feet and a second at 120 feet. Two stabilizers are shown in the collar string in Figure 1.

The normal life of the stabilizer sleeves when one or two singles are run in the string is 20 to 40 trips or approximately 200 to 400 rotating hours in most formations.

2. Stabilizers Run Full Length of Drill Collar String.



Figs. 7 and 8—Rubber stabilizer sleeves run directly on the drill collars on rig in Denton Pool near Lovington, N. Mex. Rings are heated and shrunk on collar above pin and below box to limit sleeve travel up and down drill collar. A fishing neck is provided above sleeve. Worn stabilizers are changed by merely breaking drill collar joint.

There have been two notable wells drilled in the Permian Basin where a large number of stabilizers have been run in the drill collar string.

On a wildcat 13 miles west of Crane, Texas, while drilling an 8¾-

inch hole, a stabilizer sub was used between every third drill collar beginning one collar above the bit in a string of 27—6½-inch OD drill collars. There was a total of nine stabilizers in the string. Four of the stabilizers are shown in Figure 5. The stabilizers were picked up just below the 9⅝ inch intermediate casing string at 2600 feet and were used to drill to the Ellenburger at 8100 feet. It is crooked hole country so the rotary was turned to 90 to 100 revolutions per minute for most of the well to help drill a straighter hole and increase the rate of penetration. The same nine stabilizer sleeves were used for the entire well, more than 80 trips into the hole or rotating hours in excess of 600. This is believed to be the longest series of runs yet made with the rubber sleeves. During this period of drilling the sleeves wore on the OD a total of ⅝ to ⅞ inch. One of these worn sleeves is shown in Figure 6 with a new sleeve to compare the relative wear and condition of the worn rubber. With the full string stabilized the OD wear was generally a little greater on the lower sleeves in the string than on the upper sleeves.

A second hole of importance in running long strings of stabilizers was drilled in the Denton Pool near Lovington, New Mexico. In this case, mild steel rings were shrunk directly on the drill collars, as shown in Figures 7 and 8. A shrink ring just above the pin and a shrink ring three feet below the box provided a limited three foot longitudinal space for the stabilizer sleeve, thus eliminating the additional stabilizer body between drill collars. Running the sleeves directly on the collars has proven practical because of the small amount of OD wear on the drill collar underneath the sleeve.

A string of 18 5½-inch OD drill collars was dressed with 7⅞-inch stabilizer sleeves using one sleeve every 60 feet for a total of 10. Figure 7 shows the sleeve just above the bit and Figure 8 shows a sleeve in the string. These stabilizers were run over 60 trips from 4800 feet to 10,200 feet. During the latter part of the run 6 6¼-inch OD drill collars were added at the lower end of the string to provide additional weight. Well above average drilling rates were made on this hole.

The last 2000 feet section of hole was drilled using 40 percent to 60 percent oil to lighten the mud in an effort to combat lost circulation. When running in oil there was some tendency to loosen the bond between the rubber and steel inner tube, however there was no excessive amount of rubber lost in the hole and performance in oil appears to be satisfactory.

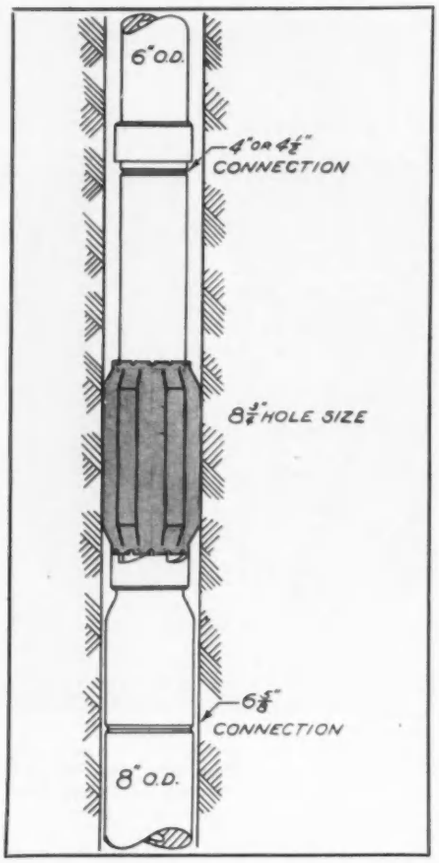



**Fig. 9**—Stabilizer cross-over sub now being used on several holes in Permian Basin where one to three large outside diameter drill collars are run on lower end of conventional size drill collar string. This stabilizer increases straight hole characteristics of lower end of drill collar string and helps prevent twist-offs between lower large collars and upper small collars.

3. Stabilizers Run as Cross-Over Subs Between Large and Small Collars.

The practice of running 1 to 3 large diameter drill collars on the lower end of the drill collar string is becoming more popular every day in the Permian Basin. The primary purpose is to drill straighter hole under heavy weights; however, several operators are using this practice in flat country to increase bit performance. The results are encouraging.

The use of a rubber stabilizer as a cross-over sub at the top of the large drill collars was first tried in the Denton Pool in Lea Country, New Mexico. On an earlier hole, the operator had a twist-off in the cross-over sub at the top of 3 8-inch OD drill collars running in an 8¾-inch hole. On the next hole in the Denton and a following hole in the Townsend Pool, a rubber stabilizer was run at the top of the large collars. This successfully prevented excessive whip in the drill collar string and to date has eliminated a failure at this critical point. This same practice is now being used on a number of holes throughout the basin. In addition to preventing twist-offs, the stabilizer 60 feet to 90 feet above the bit will aid in holding the large drill collars off the low side of the hole which increases the side cutting or straightening force on the bit. Figure 9 shows a typical stabilizer cross-over sub arrangement.

Development of rubber stabilizers has progressed rapidly during the past year. As the possible applications are more fully determined it is believed that rubber sleeve type stabilizers will become widely accepted drilling tools in the deeper holes, not only in the Permian Basin but in harder formations of other areas as well.

**—The End.**

WILLIAM S. (BILL) BACHMAN graduated from the University of Texas with a degree in mechanical engineering. During the first part of World War II he was an engineer with Douglas Aircraft Company for two years and later served as a radar officer in the Navy. After the war he was on the research staff of the Hughes Tool Company for three years working on drill string problems. In March 1951 he joined Security Engineering Company as regional field engineer in the Mid-Continent area. In May 1952 he entered business for himself and is now sales manager of Drilco Oil Tools, Inc. with headquarters in Midland, Texas.

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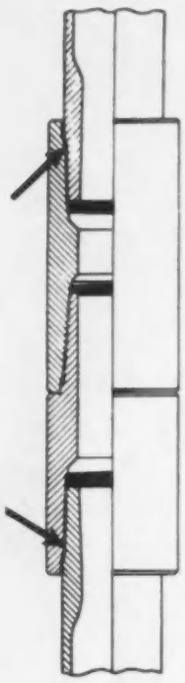


FIGURE 1

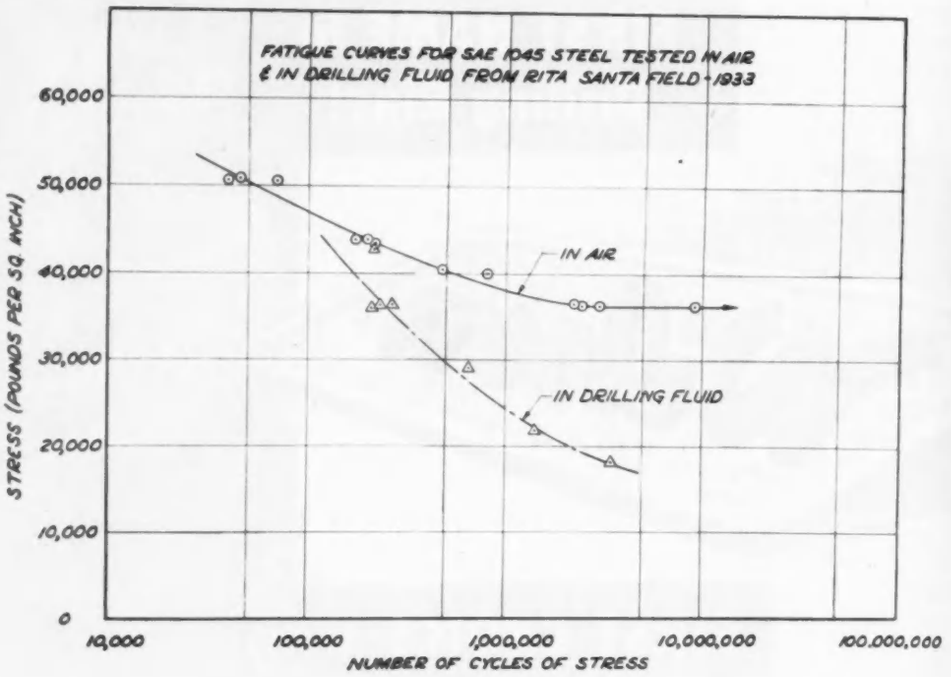



FIGURE 2

# Vulnerability of Drill Pipe To Corrosion Fatigue

**Importance of problem is reflected in rapid depreciation of drill stems in active areas of the Permian Basin.**

**By STANLEY C. MOORE,** Drilco Oil Tool Company, Midland, Texas,
and **A. P. FARR,** Hughes Tool Company, Houston

CORROSION AND CORROSION fatigue account for a large portion of the failures of drill stem members. Corrosion of drill collar boxes is frequent and serious. Practically all failures of the drill stem members result in different fishing jobs. The magnitude and the economic importance of this problem is reflected in the rapid depreciation of drill stems in the active areas of the Permian Basin.

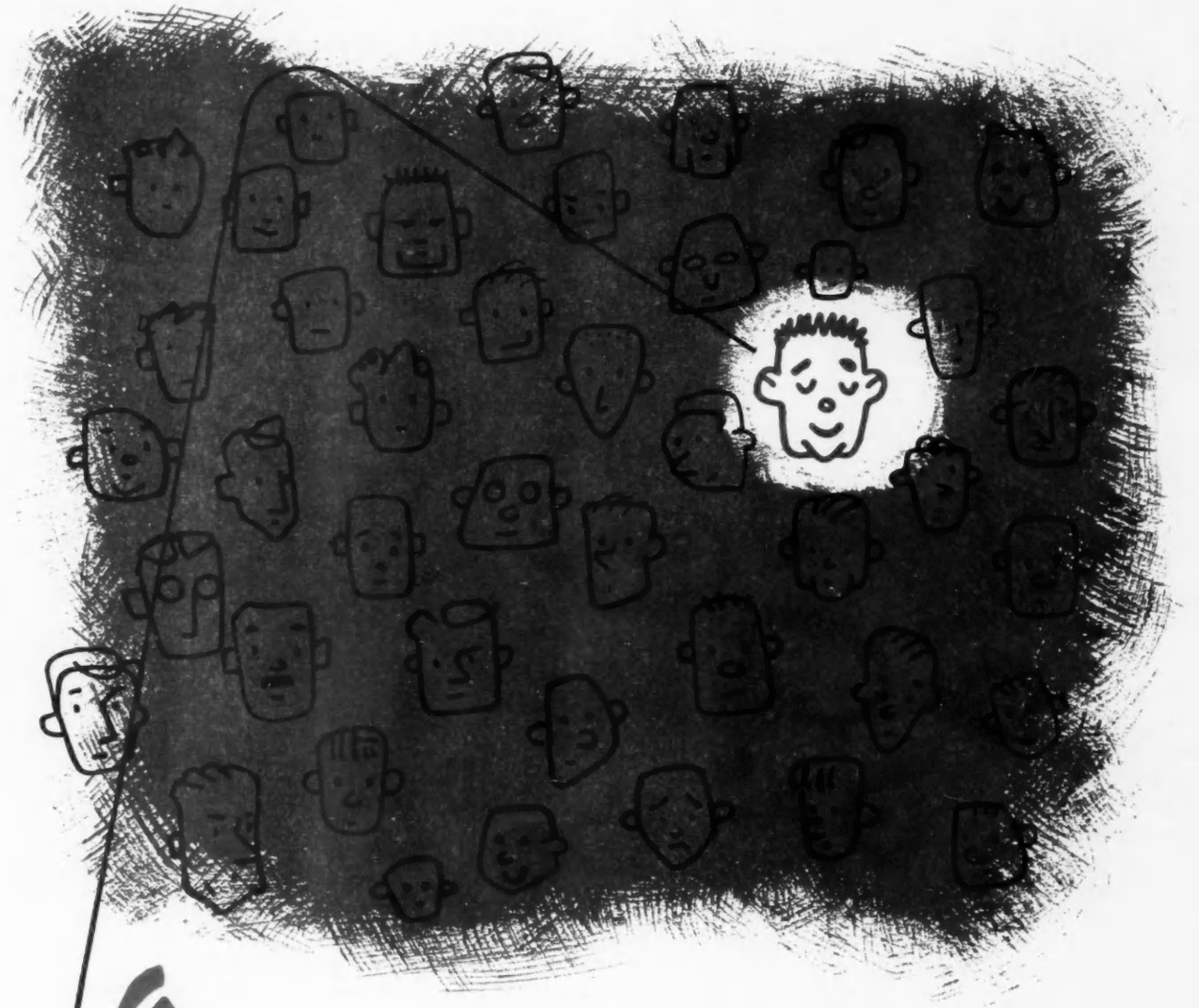
**Corrosion Problems in Permian Basin.** The Permian Basin has been one of the most active areas in the oil drilling and production industries for many years. For the last ten years, approximately one-fourth of all the drilling rigs operating in the U. S. have been located in the Permian Basin.

Each of the 700 or more drilling rigs operating in West Texas has an investment of $30,000 to $70,000 in drill stem. A recent publication of accounting figures of one West Texas drilling company showed their drill stem costs on each rig to be $137 per day.

A large portion of this cost may be attributed to rapid depreciation of the drill stem because of corrosion and corrosion fatigue. Much of this corrosion is traceable to a geological condition peculiar to the Permian Basin. Throughout the Basin there is an underlying massive salt strata at depths varying from 1000 to 4000 feet. Any well drilled in the Basin must drill through the salt section and the drilling fluid system becomes contaminated with salt.

Until about ten years ago, nearly all the wells drilled were relatively shallow, and the wells drilled through the salt section and to total depth with a saturated salt water mud. The high salt concentration approaching saturation was not particularly harmful from a corrosion standpoint.

As wells were drilled deeper in recent years, it became common practice to drill a large diameter hole through the salt zone and set casing



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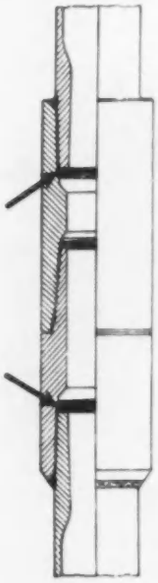

FIGURE 3

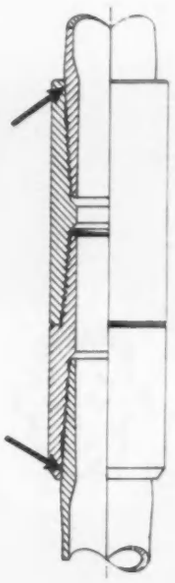

FIGURE 4

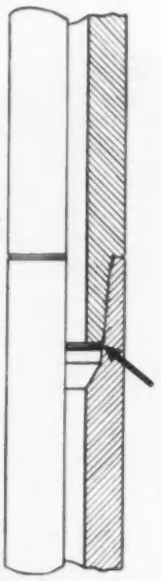

FIGURE 5

to seal off the salt section. The hole was then deepened with smaller diameter bits run down inside this "salt string." The "salt string" was considered necessary because continuous circulation of the drilling fluid through the salt section caused the hole to enlarge in this area resulting in numerous operational troubles.

Although the salt section was sealed off, the mud system was already contaminated. In some localities, surface water used for "make-up" in the mud system would contain ½ percent to 1½ percent salt. As a result of this residual salt, the circulating fluid contained from ½ percent to 5 percent salt—a very corrosive fluid.

In the last year of the recent war and the years immediately afterward, deep hole drilling increased rapidly. There was an immediate outbreak of drill stem failures. Operators who were accustomed to obtaining 100,000 feet of hole drilled with a string of drill pipe would have new strings go to pieces after drilling 10,000 to 20,000 feet. The tube mills who manufactured drill pipe were swamped with complaints and in nearly every case their laboratory investigation of samples of the pipe indicated corrosion fatigue was the culprit.

**Drill Collar Box Failures.** Although there was a tremendous amount of drill pipe failure in the area, primary concern was with drill collar joint failures. Figure 5 illustrates such a drill collar joint. Note that at the bottom of the female or box member there are several threads which are not covered by the male or pin member. It is necessary to make the pin short in order that it will not strike the bottom of the box before the shoulders can meet. In a properly made up joint, these unengaged threads are at the weakest part of the joint, and consequently at the point of greatest flexure—and greatest stress. Repeated bending at this point will produce a fatigue failure—and in the presence of a corrosive fluid, the failure occurs much more rapidly.

These box fatigue failures were extremely costly because they were usually undetected until failure occurred in the well during the drilling operation. This required a fishing operation to remove the broken-off string of drill collars, which is always costly. Further, the loss in drill collar length made the failure and repair, by machining a new joint, more costly than is at first apparent. A stand of three 30-foot drill collars is easily handled in the derrick, but when each collar is cut back to 26 feet the stand is only 78 feet long instead of 90 feet and the derrick man can't handle such a short stand. There is no place to rack them in the derrick. As a result, a stub must be welded to the end of the collars to lengthen them, or the collars replaced. Either is a very costly choice.

Drill collar box failures were a real problem in the Scurry County Reef drilling. A typical example is the case of an operator who moved four rigs in from the Rocky Mountain area. He had 20 drill collars in use at each rig. He had never before had any drill collar box failures, although he had

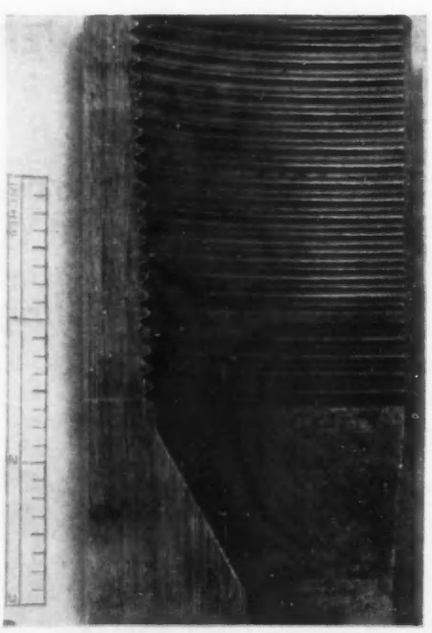

Fig. 6—A crack in the unengaged threads in the bottom of the pipe socket on an API pipe end.

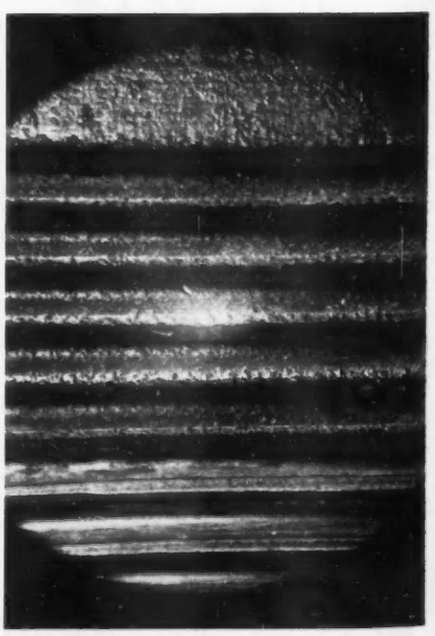

Fig. 7—An enlarged view of the zone shown in Fig. 6. Note cracks in the first threads and the extensive corrosion.

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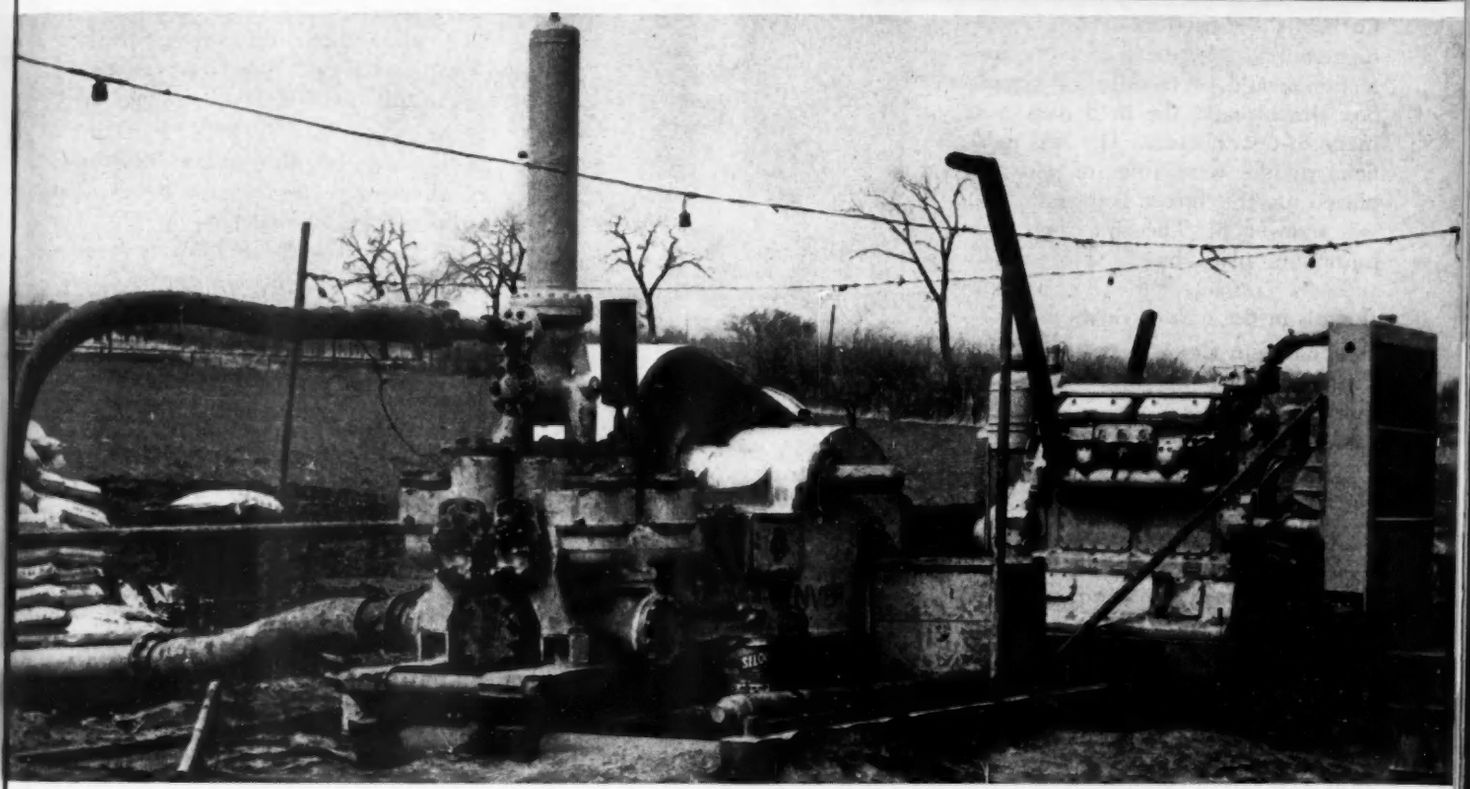

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had numerous pin failures. Within 60 days after he started operations he had experienced from four to eight box failures on each rig.

One company had introduced an improved drill collar joint which utilized cold worked thread roots to increase the fatigue life of the joint. It helped reduce pin failures, but the corrosion destroyed the cold worked surface in the boxes and box failures continued.

**Cathodic Protection Tried.** It was suggested that localized cathodic protection would protect the unengaged box threads and the field tests were made to test this idea. The first sacrificial anodes were rings of cast zinc placed in the boxes before the pin was screwed in. The zinc rings were pushed in place by the pin and intimately contacted the unengaged threads in the bottom of the box.

These zinc rings proved to be unsatisfactory from an operational standpoint and because of the cost of manufacture.

The next anodes to be tested were rings made from a magnesium strip ⅜ inch x ¾ inch cross section with an iron wire core. This strip could be heated and easily bent into the proper diameter ring and when pressed in place in the drill collar box had enough "spring" action to remain firmly in place. It later proved that as the magnesium was consumed, the iron wire core held the ring in place even though only fragments of magnesium remained.

In the first test, a string of collars was selected in which 10 boxes had been newly machined and the thread roots cold worked. Five of the boxes were protected with magnesium anode rings, five were not. After three wells had been drilled, all five of the unprotected boxes were cracked. When

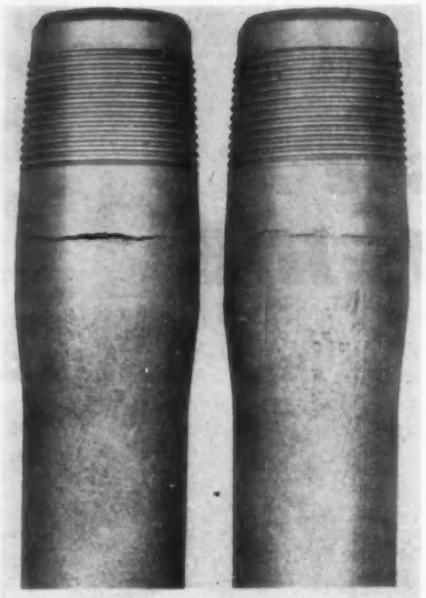

Fig. 8—Drill pipe wherein failure has occurred at the final point of contact between pipe and a shrink-tube tool joint.

we lost contact with the test after the fifth well was drilled, none of the protected boxes had cracked.

Similar tests were made with other rigs and comparable results were obtained. The use of the magnesium rings became widespread. In this area where without magnesium anode rings the life of a drill collar box is almost surely limited to less than five wells, operators consistently get service of 12 or more wells with boxes properly machined and cold worked and continuously protected by magnesium anode rings.

**Pipe Shortage Caused Problem.** There was a change in drilling practice in West Texas, which altered the situation. Because of the shortage of steel last year the use of a salt string was discontinued. In all of the Spraberry Trend (and over-all about 50 percent of the wells in the Permian Basin) wells were drilled to a total depth with saturated salt water mud. There is still some corrosion in the drill collar boxes and it would be desirable to use anode rings. However, the magnesium material deteriorates very rapidly in the high salt content mud and use of magnesium anode rings is not practical. Tests have been made using aluminum rings made of 61S alloy in the same string with magnesium anode rings. In one test, the magnesium rings were completely gone after seven days of operation. The aluminum rings were still in good condition after the well was completed —approximately 30 days operation.

**Evidence of Corrosion Failures.** Drill stem corrosion may be divided into two classifications:

- That which occurs during storage
- That which occurs during operation.

While the first is not to be ignored, it generally is less harmful and more easily controlled than the second. Corrosion of the second type, which is known as corrosion fatigue, occurs during drilling operations and is far more damaging to drill stem than corrosion which occurs during storage or stressless corrosion.

The pits produced in steel, undressed or under static stress, are generally saucer-shaped and this shape is maintained as corrosion proceeds. However, under cyclic stressing sharp deep pits are formed and as corrosion fatigue continues many of the pits become the origin of cracks which are filled with corrosion products. Finally failure occurs by the progression of one of the cracks across the section of the steel involved.

Fatigue stresses in drill stem members result when the drill stem is rotated while it is bent. During rotation, alternate tensile and compressive stresses are imposed on the bent section of the drill stem. If the imposed stresses are above the so-called endurance limit, fatigue failures will occur even in the absence of corrosion. Such failure occurs when running the pipe in compression with an insufficient number or weight of drill collars. When corrosion occurs simultaneously with fatigue action, the cycles to produce failure at a given stress are markedly reduced. In fact, it is generally accepted that steel has no en-

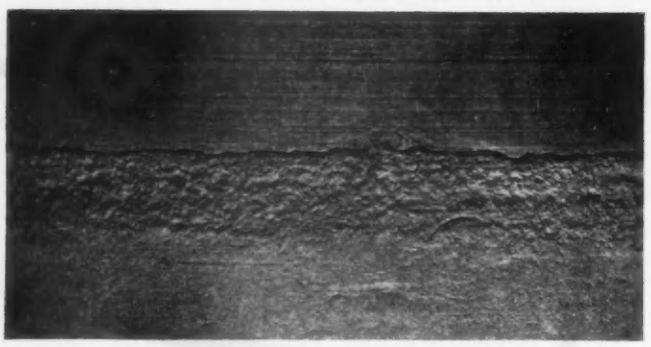

Fig. 9—A close-up of a failure similar to that in Figure 8 shows the corroded zone around the failure.

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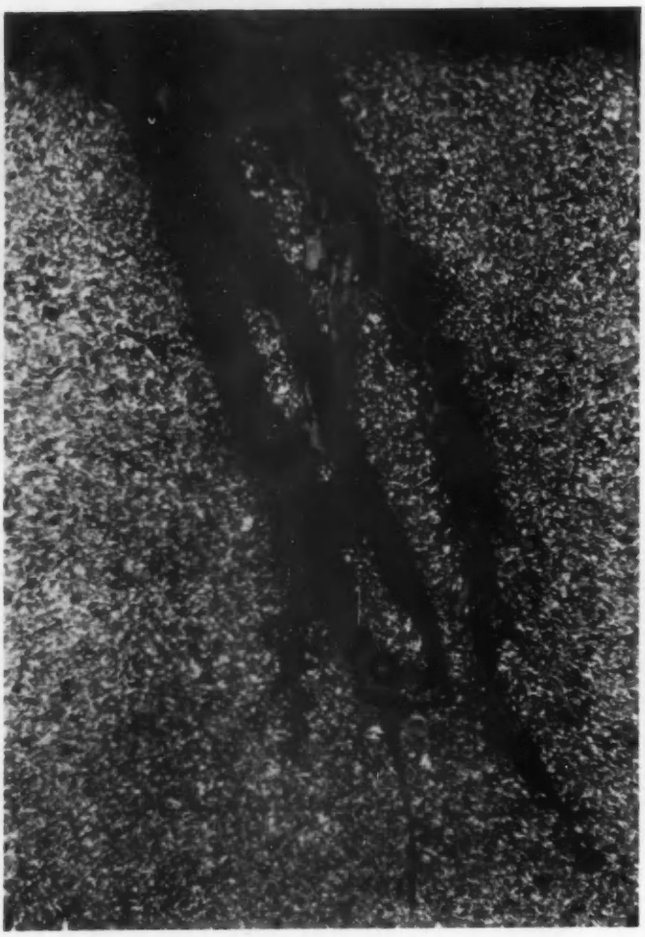

Fig. 10—An enlarged view of a sectional face containing the cracks. Note corrosion products are present at the very bottom of cracks which were approximately 0.040-inch deep.

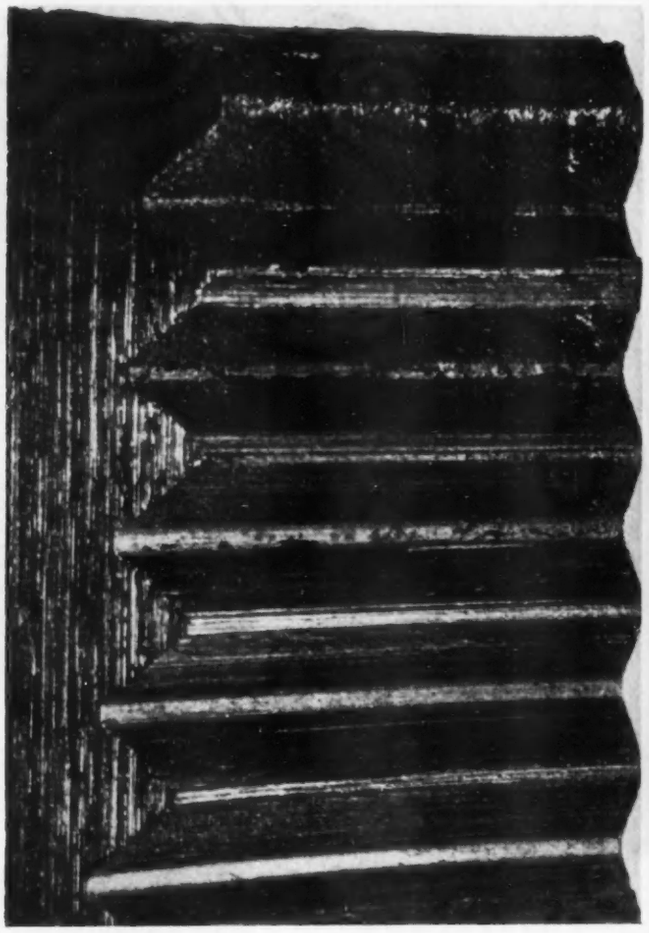

Fig. 11—A section from a drill collar box wherein failure has occurred in the unengaged threads.

durance limit in corrosion fatigue. In other words, no corrodible drill stem can last indefinitely under conditions of repeated stress and corrosion.

According to Dr. Westcott,[1] the damaging effect of the simultaneous action of corrosion and cyclic stressing on metals was first mentioned by Haigh in 1917.

Hughes Tool Company's first encounter with failure wherein corrosion fatigue appeared to be the culprit occurred in 1932 in the Rita Santa field of West Texas. The trouble encountered was failure through the pipe upset at the last engaged thread on tool joints having regular API pipe ends. A number of such failures occurred beginning 17 days after drilling was started.

A laboratory investigation was made wherein small polished unnotched samples of SAE 1045 steel were fatigue tested in air as well as in samples of drilling mud from the well where the above trouble was experienced. Figure 2 shows the fatigue curves which were developed in these tests. The method of testing might now be considered crude since the drilling fluid was merely dripped onto the test specimen surface during testing. The results, however, show the definite decrease in fatigue life caused by the mud.

At this time it was recommended that the contractor try the application of a protective coating such as asphalt base paint, or use a zinc wire wrapped around the pipe under the counterbore of the tool joint.

The particular problem in this case was solved by welding the tool joint to the pipe which prevented mud from reaching the threads in the vulnerable zone and also provided added support beyond the threads.

**Corrosive Drilling Mud.** In the presence of corrosive drilling mud the simultaneous action of corrosion and fatigue combine to cause failure in drill stem members which can lead to very expensive fishing jobs. Generally speaking, the loss of the material which fails is insignificant compared to the loss entailed in fishing operations which may last from a few hours to days or weeks.

Figures 1, 3, 4 and 5 show cross-sections of these various drill stem members and the arrows point to zones of greatest vulnerability to corrosive attack and consequently zones where failures due to corrosion fatigue are most likely to occur.

In Figure 3 again, which shows a cross-section of a counterbore weld tool joint, the arrow points to the unengaged threads in the bottom of the pipe socket. Although threads are known stress raisers, failures at this location are extremely rare in a non-corrosive environment.

In Figure 4 is shown a shrink type construction with the arrows pointing

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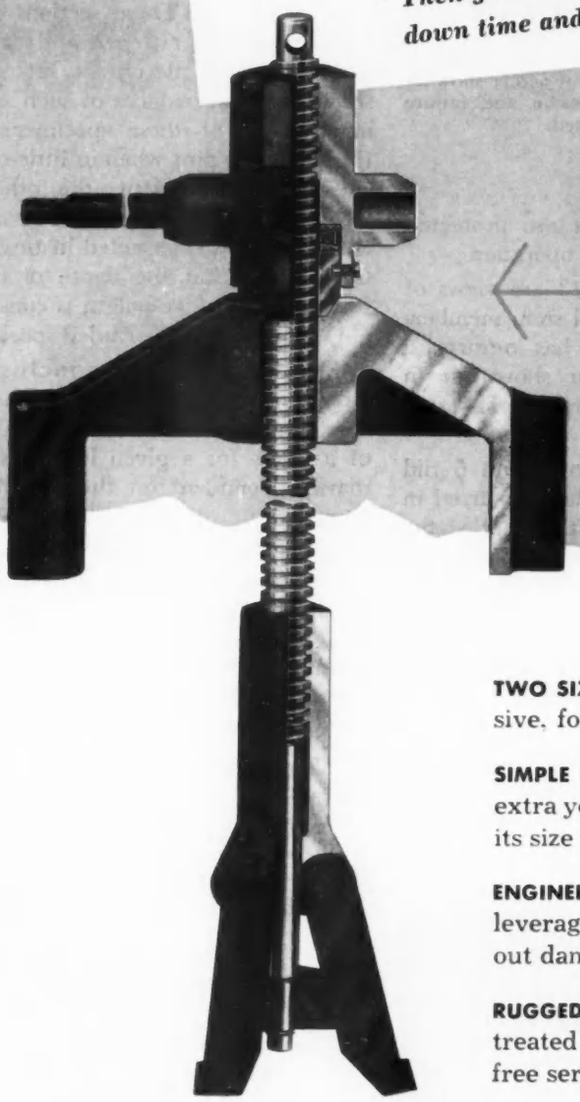

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to the zones at the juncture of the tool joint and pipe. While failures have been known to occur at this location in the absence of corrosion they are infrequent. When corrosive conditions are encountered, this zone is vulnerable to attack because the tool joint prevents the pipe from contacting the hole.

To explain further, the outside of drill stem members which touch or rub the wall of the hole are continually scrubbed and scoured so that corrosive attack is not permitted to become concentrated. In this particular zone, as already mentioned, the tool joint prevents the pipe adjacent to the shoulder from being cleaned by the wall of the hole, thus corrosion at this location can continue unhindered.

Figure 5 shows the unengaged threads in bottom portion of a drill collar box. Failures occur in this location even in the absence of corrosion and under corrosive conditions are accelerated to an extreme degree. Failures in the drill collars are particularly bad both because drill collars are more difficult to fish from the hole than other drill stem members and because the cost per foot of drill collar is high.

It should also be mentioned that fatigue failures occur in the pin members of both tool joints and drill collars. These failures, however, are generally caused by pure fatigue of the notched or threaded members and are seldom if ever influenced by corrosion

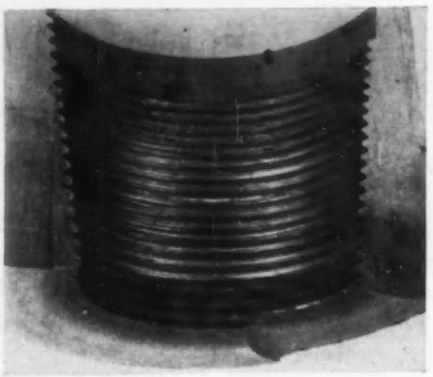

Fig. 12—A cross-section of a box showing the zone in which corrosion and failure have occurred.

since these locations are protected from corrosion during operation.

Figures 6 through 13 are views of corroded zones of drill stem members wherein field failure has occurred either in the member shown or in other similar members in the same string.

The joint shown in Figure 6 did not fail. However, failure occurred in the same location on the joint at the opposite end of the pipe. This joint had made approximately 75,000 feet of hole in South Central Kansas. Failures in this location are not common and occur generally only after extended service.

**Detecting Cracks.** It is possible by frequent, proper inspection to detect cracks in some of the members illustrated before ultimate failure occurs. Fortunately this is especially true of drill collar boxes which cause the greatest amount of trouble. Once the cracks are discovered the question of severity arises.

In an attempt to determine whether the circumferential length of fatigue cracks has any correlation with depth, sections containing various length cracks have been cut from drill collar pins and boxes. These sections were cooled in liquid nitrogen and broken in the plane of the cracks. Figure 13 shows the broken faces of such specimens. Four of these specimens are from cracked pins wherein little or no corrosion was present, the other is from a box which was rather severely corroded. It will be noted in this particular case that the depth of crack for a given surface length is considerably greater on the corroded specimen.

Although no definite conclusions have been drawn it appears that under corrosion fatigue conditions the depth of a crack for a given length is primarily dependent on the severity of corrosion.

It should be pointed out that, of the failures discussed, those occurring in drill collar boxes are by far the most frequent and most serious. The other types of failures are actually very infrequent.

The fact that practically all failures of the above types result in fishing jobs poses a very definite problem. It appears these failures might be prevented, or at least considerably reduced, if corrosion of the drill stem could be eliminated. —**The End**

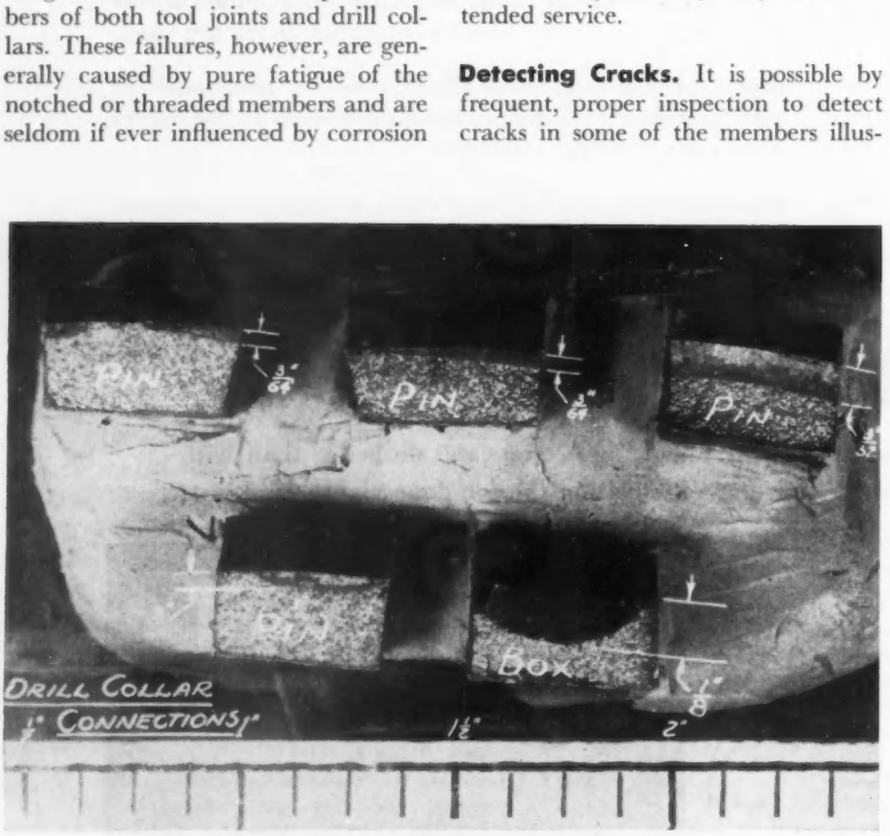


**FIGURE 13**


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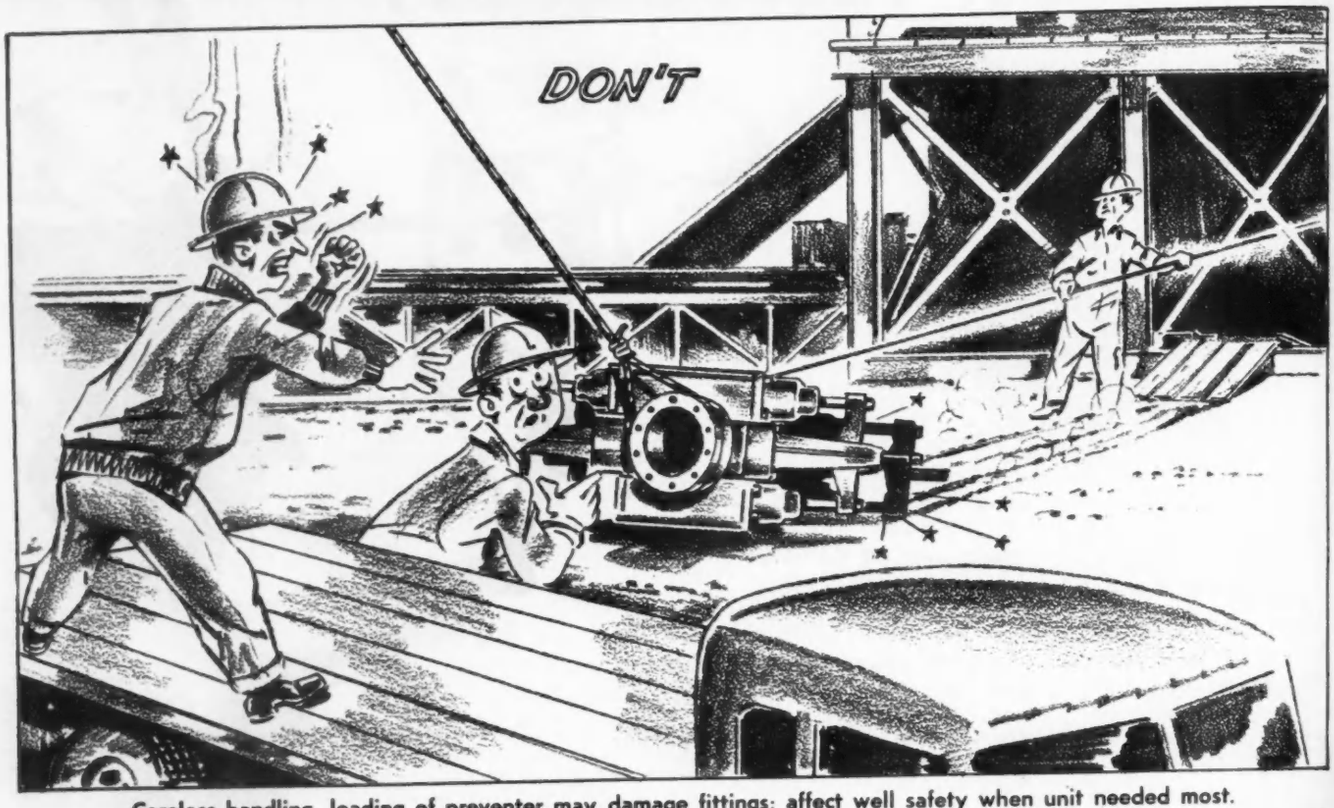


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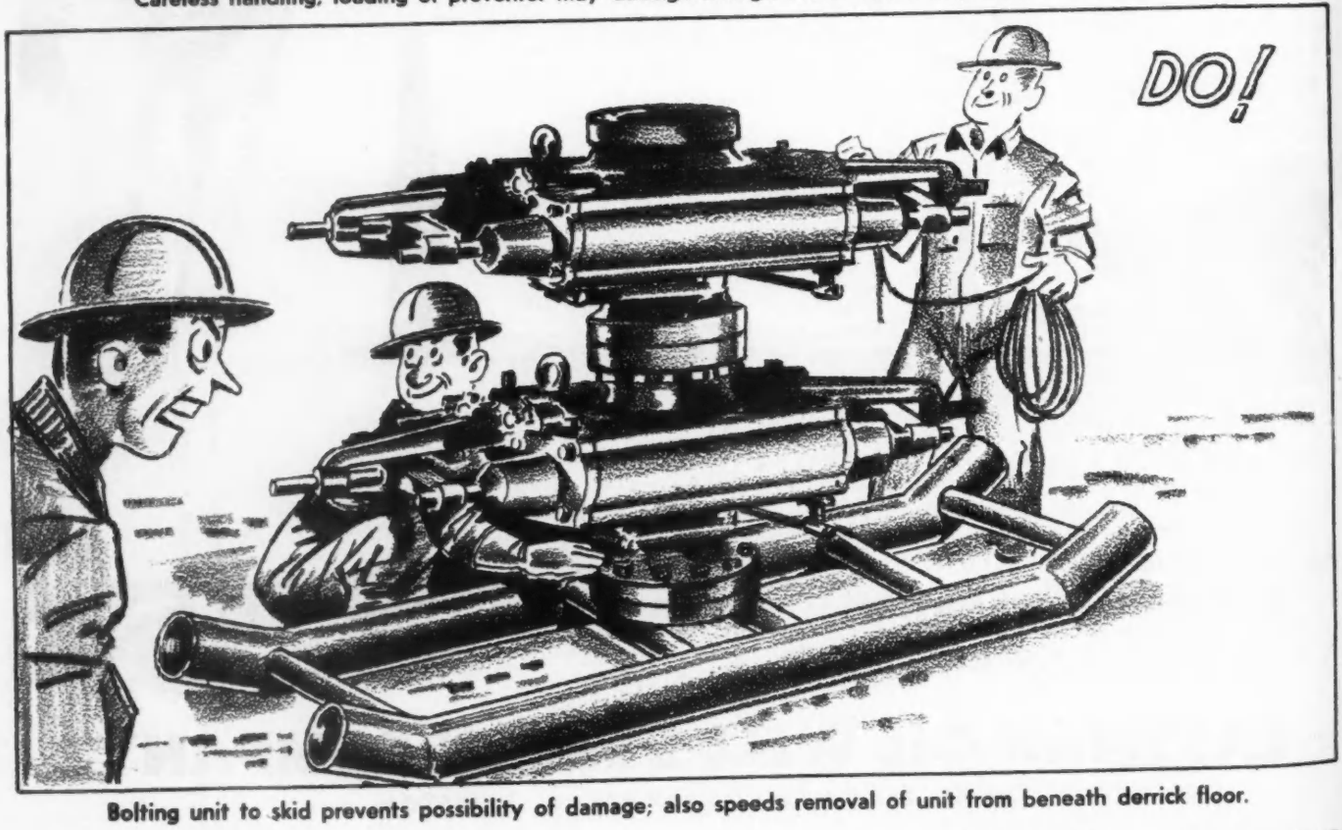


Bolting unit to skid prevents possibility of damage; also speeds removal of unit from beneath derrick floor.

A discussion of . . .

# How to Cut Costs in Crooked Hole Areas

**Editor's Note.** Producing companies can do much to help their own cause in face of sharply rising well costs. A company forcing strict adherence to low deviation clauses, is in effect adding to its per well costs by retarding drilling. Many companies are realizing this and letting 5- and 7-degree contracts. Production costs will not be materially affected by this practice, and the savings from drilling may offset production costs.

WORLD OIL published the findings of Arthur Lubinski and H. B. Woods in three parts beginning in the July issue. These findings show the factors affecting angle of inclination and dog-legging in rotary bore holes and point out ways of cutting costs in crooked hole areas.

Presented here are comments made by W. W. Moore and J. B. Murdoch, Jr., on the Lubinski-Woods paper which was offered before the Spring meeting of the API Mid-Continent District at Tulsa, March, 1953. The comments are being published as presented at the meeting, without subsequent review and revision or editing by the discussers.

**. . . by J. B. MURDOCH, JR., of Eastman Oil Well Survey Co., Long Beach, Calif.**

LUBINSKI AND Woods are to be commended for presenting the theoretical basis for an analysis of the factors affecting the deviation and dog-legging of drilled wells. They demonstrate mathematically that the drilling of a truly vertical hole to any considerable depth is a practical impossibility. Due to the small amount of weight which it would be necessary to carry on the bit, the penetration rate would be reduced so that the drilling of such a well would be economically unsound.

J. B. Murdoch, Jr.

Their findings that for a given drill collar and hole size and with a uniform weight applied to the bit an "equilibrium angle" of drift will be reached and maintained in a homogenous formation can be substantiated in practice. Surveys of many wells in uniform formation where drilling methods are standardized show that they assume and maintain a somewhat uniform angle and direction for most of the well course. Variation in the drilling procedure changes the drift angle and often turns the well course.

One of the standard methods of reducing angle in a directional well has been to use a stabilizer above the drill collar and to drill with reduced weight on the bit. It can be seen that theory bears out practice, since this drilling setup is an effective method of increasing the distance between the bit and the point of tangency of the drill pipe.

The authors' demonstration of the influence on the drift angle of the ratio of the drill collar size to the size of hole cut is substantiated by another practice used in drilling directional holes. To increase drift, a stabilizer is used immediately above the bit with plain drill pipe run above the stabilizer in lieu of drill collars. Using this setup with increased weight on the bit invariably increases the drift. A variation of this setup which often is used immediately after a deflecting tool run is to eliminate the stabilizer and drill with plain drill pipe above the bit. This generally increases drift in the well and continues the directional turn initiated by the whipstock. The theoretical data in this paper shows that the ability of the drill string to bend in the hole tends to increase the equilibrium angle of drift.

The effect of clearance between the drill collar and the hole increases only when the greatest weights are applied to the bit. Since, in general, the equilibrium angle is greatest for extreme weights it would seem best to employ oversize drill collars with weights less than the extreme and accept a certain amount of drift as a requisite for increased rate of penetration. Instances cited in the paper show that a considerable saving in drilling expense has been realized in allowing the drift angle to increase moderately.

This analysis shows that doglegs of small magnitude are caused by a sudden increase or decrease in the weight applied on the bit, and that when the bit is drilling in highly inclined beds the dogleg is much greater. The use of oversize drill collars reduces the change of angle since the clearance is smaller preventing the bit from realigning the well course. The instantaneous change of angle is almost identical regardless of the amount of weight carried, so that drilling with increased weight will not result in a sharper dogleg. Therefore, the theory

of using oversize drill collars and additional weight on the bit commensurate with maintaining a moderate drift angle in the hole in no way cause sharper doglegs in the well course.

Recently an investigation was made preparatory to writing a paper on the methods used, and difficulties presented in producing directional wells. Operators were chosen who had produced a great number of directional wells over long periods of time. The consensus of their opinion was that the inclination of the well (even with drift angles as great as 75 degrees) had very little effect on production difficulties.

The principal cause of sucker rod and tubing wear, as well as some of the pump abrasion, was attributed to doglegs in the well course. A number of operators stated that they would prefer to pump highly deviated wells with uniform courses, than so-called straight wells in which the course of the hole was in a tight spiral or which contained sharp kinks. Probably a dogleg limit of 3 to 4 degrees per 100 feet of well drilled would be practical from a standpoint of economical production practice.

Doglegs in shallow depths of the well are likely to cause more sucker rod and tubing wear than those deeper in the hole, since more weight of moving equipment is bearing on the side of the hole in the first instance.

Production engineers considered that pumping costs could be reduced materially if wells were drilled more carefully to eliminate sharp bends in their courses, and that extreme care to keep drift angles low was unnecessary. From those opinions it would seem that allowing wells to deviate beyond present straight hole contract limits would have little effect on production costs.

•

**The authors reply . . .** The authors wish to thank J. B. Murdock for his interesting comments. The most important of these may be summed up as follows:

- Production troubles are due to doglegs.
- Inclination of the well (even with drift angles as great as 75 degrees) has very little effect on production difficulties.

The last comment is very significant in view of the fact that the authors recommend drilling holes inclined up to 15 or 20 degrees only.

---

**. . . by WESLEY W. MOORE of British American Oil Producing Co., Dallas**

IN THIS PAPER, the authors have analyzed quantitatively the factors affecting the angle of inclination and dog-legging in rotary bore holes. These analyses can serve as a guide for substantial reductions in rotary drilling costs.

W. W. Moore

I shall confine my comments to the conclusions reached by the authors, and in support thereof, shall present some case histories which should be of interest.

Figure 1 represents the drilling progress of the well in Fremont County, Wyoming, referred to by the authors as the one used in my discussion of R. C. McCloy's paper presented in 1952 at Wichita, Kansas. It is reshown at this time for the purpose of illustrating by example the authors' conclusion in which they stated:

*"In crooked-hole territories, cost of drilling may be lowered by carrying much more weight and deliberately accepting a larger deviation; this does not result in sharper doglegs. Such a method could not be used in steeply dipping formations because unreasonable deviation would result."*

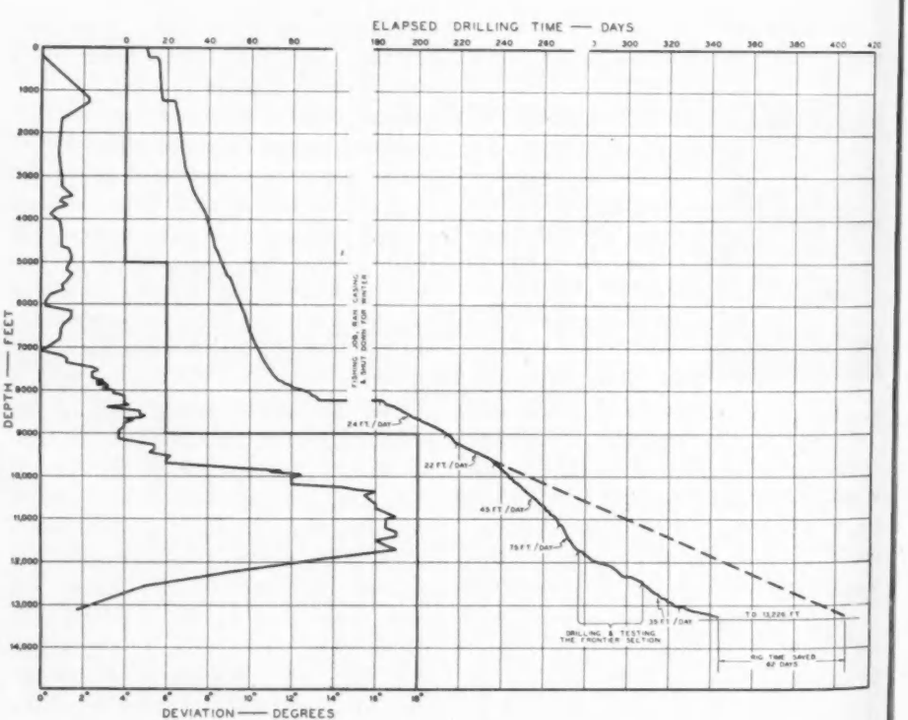
ELAPSED DRILLING TIME — DAYS
DEPTH — FEET
DEVIATION — DEGREES
24 FT / DAY
22 FT / DAY
45 FT / DAY
75 FT / DAY
35 FT / DAY
DRILLING & TESTING THE FRONTIER SECTION
TD 13,226 FT
RIG TIME SAVED 62 DAYS

FIGURE 1

It will be noted that by deliberately accepting the larger deviation, it was possible to reduce rig time an estimated 62 days. Since this was a very large rig, it is estimated that the savings on this well approximated $85,000. I do not fully agree with the authors in their statement that *"such a method cannot be used in steeply*

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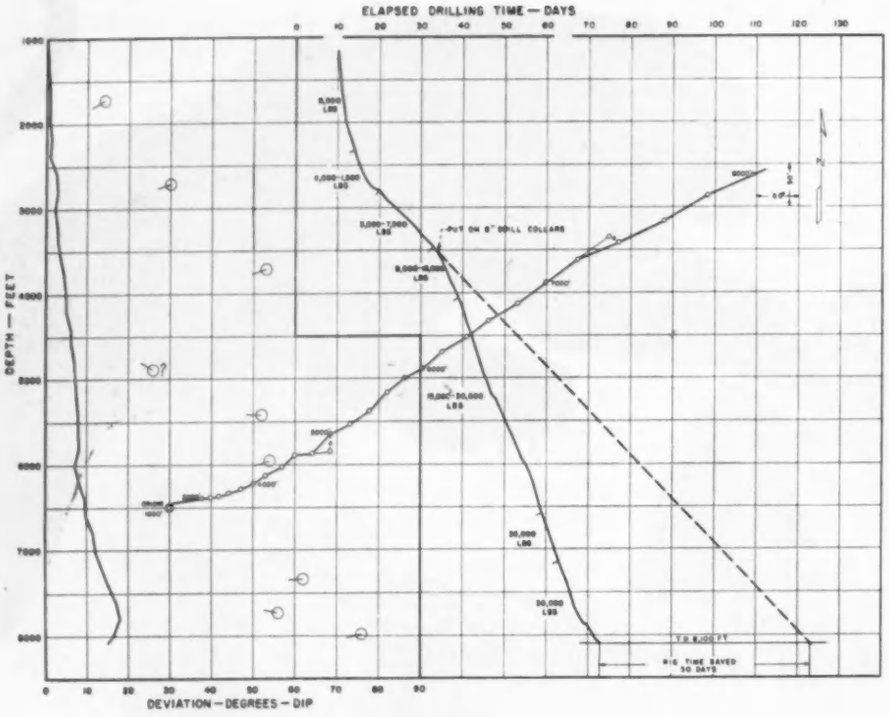


FIGURE 2

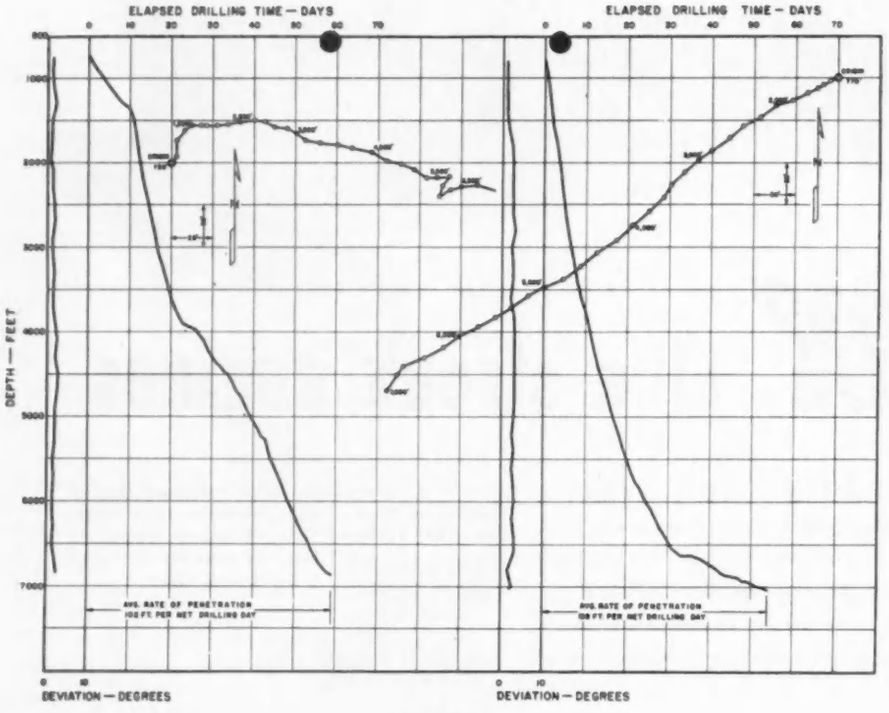
ELAPSED DRILLING TIME — DAYS
ELAPSED DRILLING TIME — DAYS
DEPTH — FEET
DEVIATION — DEGREES
DEVIATION — DEGREES
AVG. RATE OF PENETRATION 139 FT. PER NET DRILLING DAY
AVG. RATE OF PENETRATION 102 FT. PER NET DRILLING DAY

FIGURE 3

*dipping formation because unreasonable deviation would result."*

Figure 2 represents the drilling progress of a well in which very steeply dipping beds were encountered and which was drilled rapidly without creating serious doglegs even though the angle of deviation climbed to as high as 18 degrees. This particular well was a wildcat drilled on a lease across an overthrust fault from the main part of the field and the surface location was so situated as to permit a drift even larger than was experienced without either crossing the fault or going beyond the lease boundary. The drilling of this well, because of lease commitment, was an operation against time; therefore, it had to be drilled rapidly at whatever cost.

Difficulties experienced in maintaining straight hole from the surface down to about 3500 feet made it appear improbable that we could successfully drill to desired depth in the allotted time using 6¼-inch drill collars; therefore, 8-inch drill collars were used in a 9-inch hole below 3524 feet. Weights carried are noted along the drilling progress curve. Doglegs can be noted at 4800 feet and at 7200 feet, but no drilling difficulty was experienced in the entire 8100 feet of hole.

The cost of drilling this dry hole was comparable to the drilling of other wells in the field where dips of the formation do not exceed 12 degrees. It is difficult to estimate what the cost would have been had we refused to accept so large a deviation from vertical.

In support of the author's conclusion: *"using larger drill collars with which more weight may be carried without increasing deviation. Examples: 8-inch collars in 9-inch hole, 11-inch collars in 12¼-inch hole"*—I offer Figure 3 which shows the drilling progress at the Steamboat Butte field in Wyoming of two wells drilled with the same rig, using the same crews and same pusher. Both wells were located in areas of relatively flat dip; one, however, was west of the axis while the other was east of the axis. The principal difference in the two wells was the use of 8-inch drill collars in a 9-inch hole at the well on the right, whereas, 6¼-inch drill collars in a 9-inch hole were used at the well on the left.

Weight on bit for the well on the right averaged something like 30,000 pounds with a maximum of 45,000 pounds, whereas, the weight on bit for the well on the left averaged about 20,000 pounds with a maximum of 35,000 pounds. It can be noted that the maximum deviation for the well on the right was 3 degrees as compared to 2¾ degrees for the well on the left.

Average rate of penetration per net drilling day for the well on the right was 139 feet as compared to 102 feet for the well on the left. Since in this field the price per foot for drilling is based on the average rate of penetra-

**Continued on Page 220**

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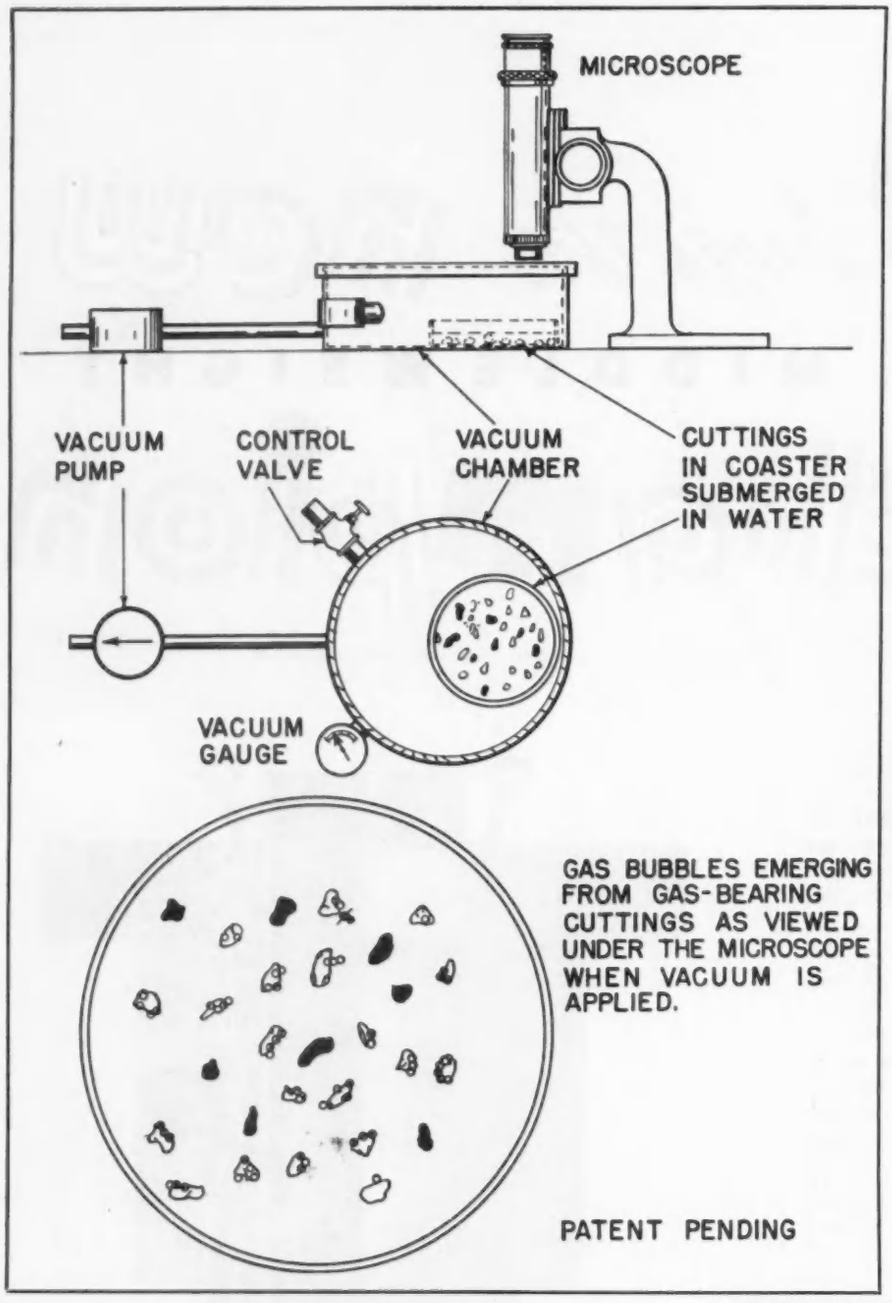
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GAS BUBBLES EMERGING FROM GAS-BEARING CUTTINGS AS VIEWED UNDER THE MICROSCOPE WHEN VACUUM IS APPLIED.
PATENT PENDING

Fig. 1—How the vacuum works.

# Vacuum Method Detects Gas-Bearing Formations

## Microscopic study of well cuttings in a vacuum reveals release of gas bubbles.

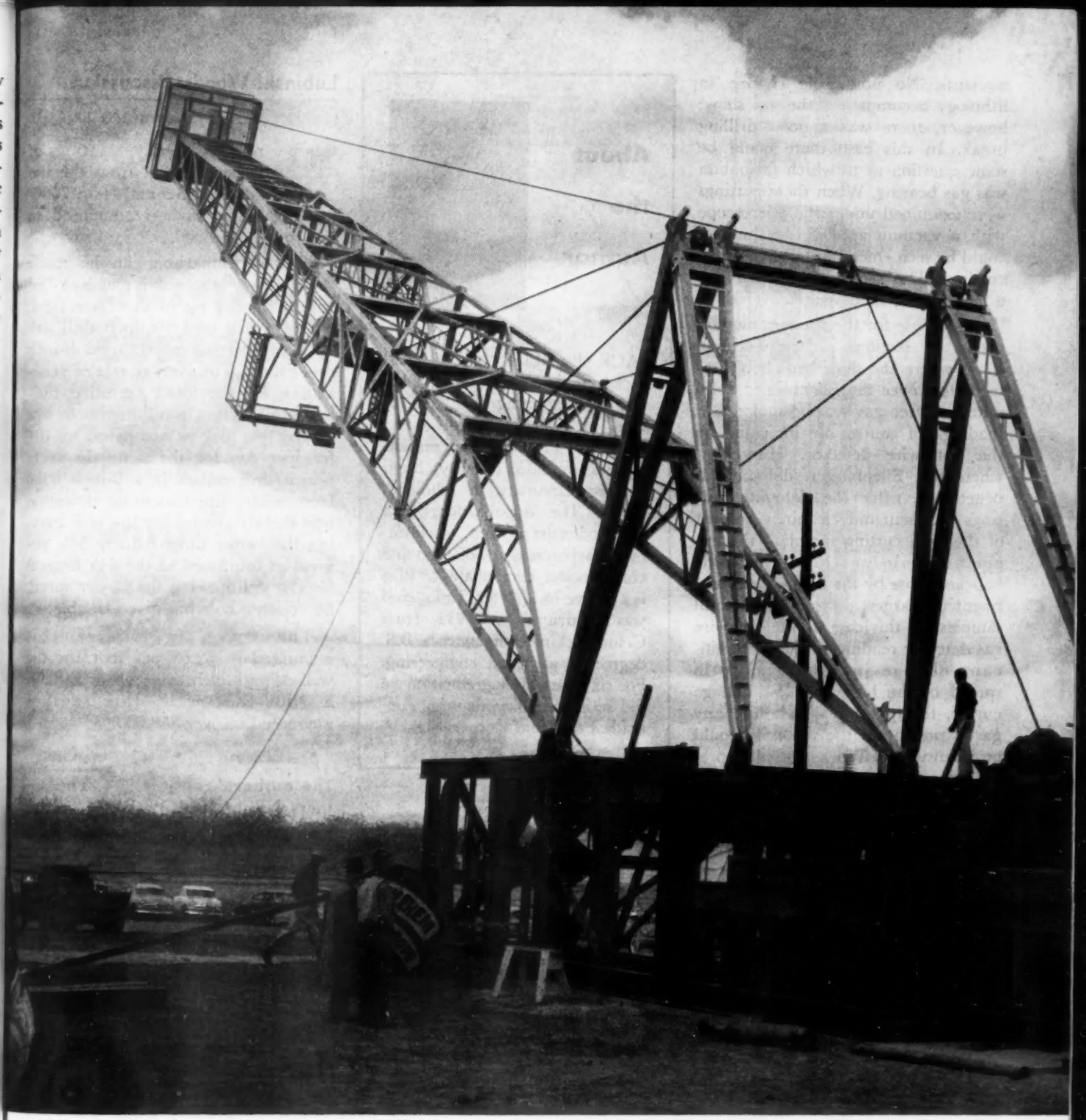
By **JACK E. BLISS,** Rotary Engineering Co., Midland, Texas.

RECENT DEVELOPMENTS have greatly improved the effectiveness of gas detection in hydrocarbon well logging. Detection of gas in drilling wells by the hot wire detector has been practiced extensively in recent years. During the past year, a new "Two Bridge System" has been introduced for identifying fresh gas shows from the bottom of the hole. This method is of great assistance in logging gas shows; however, when the following condition exists some additional information is needed: when the cutting samples represent two or more types of formation, and a fresh gas show is encountered with no noticeable change in lithology, there can be some question as to which formation is gas bearing. A step toward answering this question is provided by the new vacuum method.

**GAS BUBBLES** emerging from formation cuttings are viewed under microscope after vacuum has been applied.

The vacuum method is relatively simple. It is shown in Figure 1. A small representative amount of well washed cuttings is submerged in about one quarter inch of water in a smooth glass coaster. This coaster is placed in a small vacuum chamber and a transparent lucite lid is secured in place. This vacuum chamber is then placed under the microscope which in turn is focused on the cuttings. Next, the vacuum pump is started and the vacuum is gradually applied by slowly closing the control valve while the cuttings are examined for gas bubbles. Gas bubbles will be seen to emerge from any gas bearing cuttings.

A good example of the value of the vacuum method occurred recently when a gas show from both the cuttings and mud was detected on the hot wire gas detector. Shale, limestone and sand were all present in the cutting samples in about equal



**Wire Rope at Work**—In the oil fields, wire rope labors in many ways. Here it is shown raising a big 142-ft jackknife derrick into working position. As can well be imagined, the stress on the rope, especially during initial pull, is very high; and both the rope and the mast slings must be able to take severe punishment during this operation.

The outfit pictured here is equipped with 3500 ft of Bethlehem 6x19 Purple Strand rotary line, preformed; diameter, 1⅛ in.; core, IWRC. The mast slings are 1⅝-in. 6x37 Purple Strand with fiber core. A typical installation, one very common nowadays, for Bethlehem ropes and slings are strong favorites in all parts of the oil country, where the demands are unusually severe.

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amounts. No noticeable change in lithology accompanied the gas show; however, there was a good drilling break. In this case there could be some question as to which formation was gas bearing. When these cuttings were examined under the microscope with a vacuum applied, gas bubbles could be seen emerging from the sand cuttings. This section was cored and a gas bearing sand was recovered.

A good use for the vacuum method occurs in sections of the Permian Basin where the shale beds lying immediately over the Ellenburger dolomite are often gas bearing shales. Gas readings, of course, are indicated on the hot wire detector. However, when the Ellenburger dolomite is penetrated, ofter the dolomite cuttings represent only a minor percent of the total cutting samples—the lingering shale cuttings and shale knocked loose by the drill collars represent the largest portion of the total samples. In this case, if the hot wire gas detector readings show no significant change in magnitude or in spread of the high and low voltage curves, the question of whether any gas is present in the dolomite could go unanswered. When a small representative amount of the samples is examined in the vacuum chamber, if the dolomite is gas bearing, gas bubbles will be seen as the vacuum draws them to the surface of dolomite cuttings.

In two instances where small gas shows were logged in the mud by the hot wire detector, the cuttings were examined by the vacuum method and small bubbles were seen emerging from under calcite deposits and from slightly rough spots on the fractured surface. When cuttings containing unconsolidated sand from gas producing sands are viewed under vacuum, gas bubbles can be drawn from irregular or rough spots on some of the sand grains. This may seem rather incredible but there seems to be a submicroscopic film of gas clinging to the irregular spots on the sand grains, which will be expanded many times its atmospheric size when a vacuum is applied. The gas film will expand in accordance with Boyle's Law:

$$= \frac{P_2V_2}{T_2}$$

Since there is little change in temperatures the formula becomes:

$P_1V_1 = P_2V_2$

$P_1$ = Atmospheric Pressure, 14.7 pounds per square inch

$P_2$ = 0.1 pounds per square inch, which is well within the range of the vacuum pump used.

$V_1$ = Volume of gas film at atmospheric conditions

$V_2$ = Volume of gas bubble when vacuum is applied

$$14.7\,V_1 = 0.1\,V_2$$

$$V_2 = \frac{14.7}{0.1} \times V_1 = 147V_1$$

This means that the gas film has been expanded to about 150 times its atmospheric size.

As one would expect, the tight or low permeability gas bearing cuttings require a high degree of vacuum to pull out the gas bubbles. Experiments are now being conducted to determine just how much use can be made in correlating any ranges of permeabilities to inches of mercury vacuum applied.

In every case where a fresh gas show has been detected on the hot wire bridge, by using the vacuum chamber the operator has been able to identify the formation that was gas bearing. —**The End**

## About the Author

JACK E. BLISS has a broad background in hydrocarbon well logging, beginning this kind of work in 1939. In 1944, he and Olin R. Prather, the present owners, founded Rotary Engineering Company in Midland, Texas. The organization, with affiliated companies, performs hydrocarbon analysis of mud and cuttings and core analysis. Bliss is a native of Greeley, Colo., and was graduated in 1933 from Colorado University with a B.S. degree in electrical engineering. For six years after graduation he did seismograph work with Amerada Petroleum Corporation.

## Lubinski-Woods Discussion

*Continued from Page 216*

tion per net drilling day, a savings of $2.71 per foot resulted from the use of 8-inch drill collars and for a 7000-foot well, this savings amounted to very nearly $19,000.

Similar comparison can be made between two other similar wells drilled with a smaller rig in this same field, one of which used 6¼-inch drill collars, and one of which used 8-inch drill collars. The average rate of penetration for the small rig using 6¼-inch drill collars in a 9-inch hole was 80 feet per day as compared to 104 feet per day for the same rig using 8-inch drill collars in a 9-inch hole. Here again, the maximum deviation was slightly greater for the well making the better time, namely 5¼ degrees as compared to the 4¼ degrees for the well making the slower speed, but neither hole has given trouble.

The savings in footage cost amounted to $2.63 per foot for the well using 8-inch drill collars and for a 7000-foot well, this savings amounted to over $18,000.

•

**The authors' reply . . .** The authors wish to thank W. W. Moore for his valuable discussion. His actual field examples confirm the conclusions of the paper based on theoretical findings. He does not wholly agree, however, with the conclusion that in steeply dipping formations, carrying heavy weight would result in unreasonable deviations. Mr. Moore has perhaps misunderstood our conclusion 2a, which for additional clarity should have been worded as follows (new text is italicized):

2. In crooked-hole territories, cost of drilling may be lowered by:

a. *Using conventional drill collars, but* carrying much more weight *than generally done* and deliberately accepting a larger deviation; this does not result in sharper doglegs. Such a method could not be used in steeply dipping formations because unreasonable deviation would result.

In Moore's example of his Figure 2, 8-inch outside diameter, i.e., oversize, drill collars are used below 3500 feet and this chart is a good example for our conclusion 2c rather than 2a. (See Page 178, September WORLD OIL.) —**The End**

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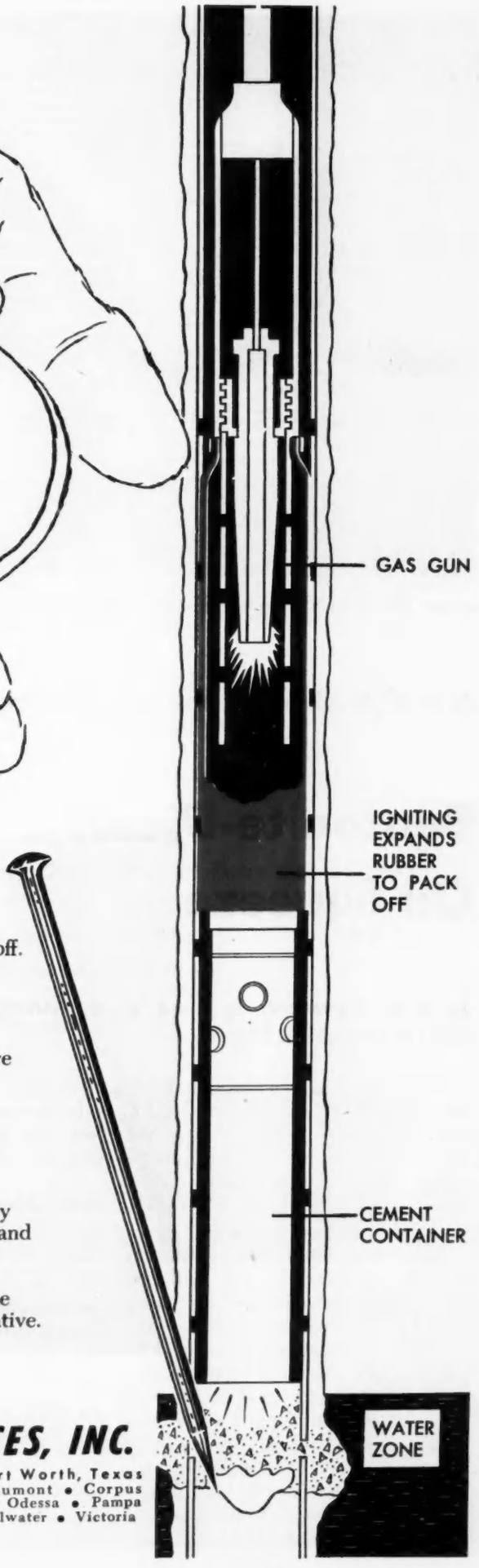


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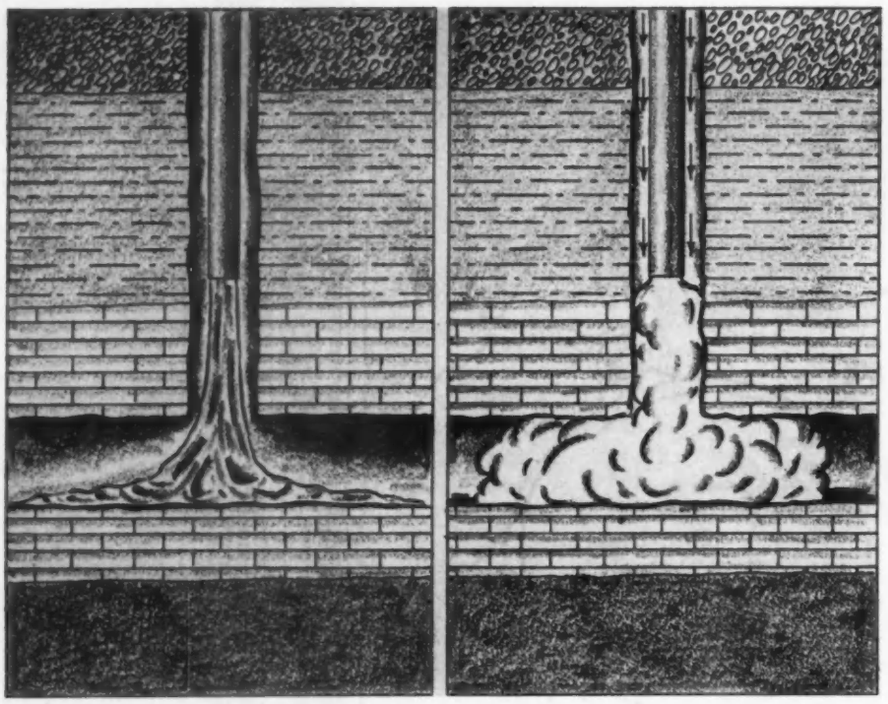


**FLOW OF CEMENT** and bentonite-diesel oil mixture into cavernous zones, as pictured by the author.

### A new development for lost circulation . . .

# Bentonite-Diesel Oil Squeeze

**By D. D. DAWSON, JR., and W. C. GOINS, JR.,**
Gulf Oil Corporation, Houston

ONE OF THE MOST promising developments in the fight against circulation loss, is the bentonite-diesel oil squeeze.[1,2] The method has proved highly successful in restoring circulation caused by formation breakdown, caverns and crevices.

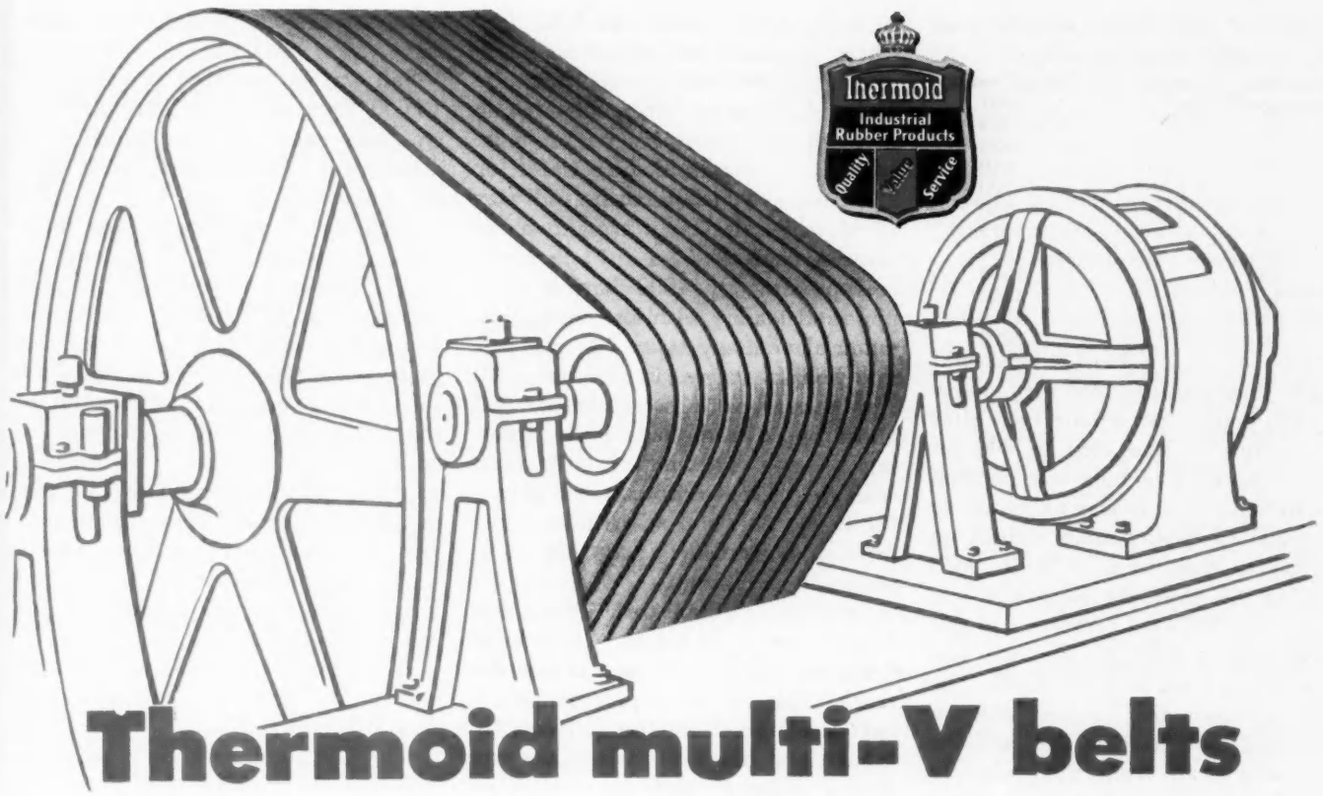
Laboratory tests have shown that a high concentration of bentonite mixed in diesel oil (or any other inert suspending medium) in the order of 300 pounds per barrel or higher, will set to a stiff consistency if mixed with mud or water in the ratio of about 2 parts of the bentonite-diesel oil mixture to 1 part of mud or water. This indicated that such a mixture could be used to seal off loss of circulation if the bentonite and diesel oil could be caused to mix with mud at a point below the drill pipe and squeezed into the zone of loss. The following is a report of several successful trials of this technique.

**Field Uses.** A field trial of this method was made on a well in the Krotz Springs field, St. Landry Parish, La. This well had lost 350 barrels of mud while drilling at 9827 feet using a 14.0 pounds per gallon mud weight; 9⅝-inch casing was set at 9599 feet. After reducing the mud weight to 12.9 ppg and adding 7 pounds per barrel of sealing material, circulation was regained. A spinner survey showed the point of loss to be 9632 feet. The mud density was raised to 13.3 ppg and drilling continued to 9925 feet. The formation broke down when pressure tested to 400 pounds per square inch, which was equivalent to a 14.1 ppg mud density at the point of loss. Because of anticipated high pressures it was desired that the formation be able to hold a 15.5 ppg mud weight, which required that the test pressure be 1130 psi with a 13.3 ppg mud in the hole. It was decided to run a bentonite-diesel oil squeeze to cause the formation to withstand this pressure.

The bit was placed at 9591 feet, 8 feet above the casing seat. Two cementing trucks were used, one a "super cementer" power truck and the other a 4-pump steam truck. These were connected to the drill pipe and the lines pressured with water. The trucks were drained of water and flushed by displacing 6 barrels of diesel oil into the drill pipe. The squeeze mixture was then mixed in the measuring tanks of each truck using 14.2 barrels of diesel oil, 43 sacks of bentonite, 2 sacks of chopped cellophane, and 2 sacks of fine mica in each. This gave a total of 40 barrels of squeeze mixture containing 303 pounds of bentonite per barrel of diesel oil and 10 pounds of sealing material per barrel of squeeze mixture.

This was displaced into the drill pipe and the truck measuring tanks cleaned with 6 barrels of diesel oil. This was also displaced into the drill pipe. One truck then pumped in 84 barrels of mud, which placed the first oil at the bit, at which time the blowout preventer was closed. The formation was broken down with 375 psi pressure, as measured in the casing.

One truck pumped 50 barrels of mud down the drill pipe while the other pumped 13 barrels of mud down the annulus. This mixed mud into the squeeze mixture at a 1-to-3.85 ratio as it passed through the bit and left 2 barrels of diesel oil in the drill pipe at the end of the squeeze. Three barrels of diesel oil remained in the open hole down to the point of loss and 1 barrel had been displaced into the point of loss. Pumping was at such a rate that 3.7 barrels of fluid were displaced into the formation each minute during most of the squeeze, but this was reduced to a very slow pumping rate for the last part of the squeeze. Casing pressure readings were taken as each 5 bar-

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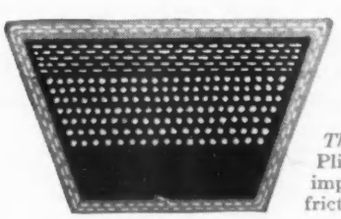

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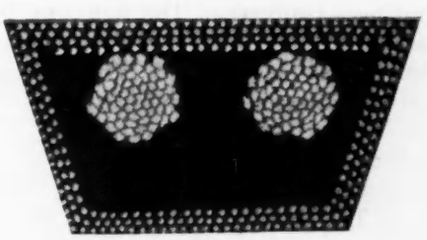

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rels of mud were forced into the drill pipe and they were as follows:

| Barrels Mud Squeezed into Drill Pipe | Casing Pressure (psi) |
|---|---|
| 0 | 375 |
| 5 | 425 |
| 10 | 510 |
| 15 | 700 |
| 20 | 950 |
| 25 | 1025 |
| 30 | 1200 |
| 35 | 1300 |
| 40 | 1550 |
| 45 | 1750 |
| 50 | 2000 |
| | (final & maximum) |

The final pressure bled very slowly to 1150 pounds per square inch after 15 minutes. It had bled to 800 psi after 1 hour. The hole was cleaned out to 9633 feet. It was necessary to use 3000 to 8000 pounds weight on the bit to drill from 9621 to 9633 feet. At this point the formation was tested with 1100 psi pressure and this slowly bled to 1050 psi. The hole was then cleaned out to total depth. The bridging from the squeeze mixture continued hard to 9794 feet, and the hole was clean from this point to total depth. The open hole was then tested with and held 1150 psi pressure.

Later, while drilling at 10,669 feet circulation was again lost. The point of loss was found by spinner survey to be different than that in the first loss, however, and it was squeezed off successfully in a manner similar to that used on the first squeeze.

In another case, a Nueces County, Texas, well was drilled to 1060 feet by another operator; 9⅝-inch casing was set at 1047 feet and cemented with 350 sacks common cement. When drilling was resumed, new hole was drilled from 1060 feet to 1070 feet at which point the well blew out while making a connection. The well blew gas, sand, and water for two hours before the hole bridged. The drill pipe was dropped and the master valve closed. While recovering drill pipe, the formation was broken down during an attempt to establish circulation. The drill pipe was pulled and rerun open-ended to bottom of casing although it was not possible to circulate or keep the hole full.

Two 300-sack batches of cement with 2 to 4 percent gel were pumped into the formation through open end drill pipe with no pressure—still unable to keep the hole full. A retrievable cement retainer was then run to 953 feet and two 400 sack batches of cement were pumped into the formation with no pressure build-up. Cement was drilled to 1067 feet where returns were again lost while pulling out of hole to recement it. The well blew out when all but one stand of drill pipe was out of hole. It blew gas, sand and some water for 22 hours, at which time the well was killed with salt water using two cementing trucks.

Approximately 1000 barrels of 9 ppg mud loaded with lost circulation material of many types was pumped into hole in stages. In addition, 300 empty mud sacks were rolled, tied and dropped in the hole while pumping in 9 ppg mud and lost circulation material. After completion of above, the hole would not stay full and the decision was made to try the bentonite-diesel oil mix.

Drill pipe was run to 1045 feet and 7 barrels of diesel oil and 21 sacks of bentonite were mixed in a cementing truck. This mix was preceded by 4 barrels of diesel oil and followed by 4 barrels of diesel oil to keep the mix from contacting water or mud while in the drill pipe. While displacing out of the drill pipe, mud was pumped into the annulus at the rate of 1 barrel of mud to 4 barrels of mix. After displacing this batch, the hole would stand full, but it was possible to pump into the formation with no pressure build up. Approximately 120 barrels of bentonite-diesel oil mix were then pumped in the following mixture ratios.

14 oil—40 bentonite
14 oil—56 bentonite
14 oil—56 bentonite
14 oil—49 bentonite
14 oil—55 bentonite
14 oil—47 bentonite

Circulation was established and bridges of cement sacks were drilled to 1073 feet when circulation was again lost. The following batch mixtures were then pumped into hole:

7 oil—25 bentonite
14 oil—50 bentonite
14 oil—49 bentonite
7 oil—22 bentonite

Circulation was established with the second batch. The third had a pumping pressure of 200 psi and the last batch was pumped in for added protection at the same pressure. Drilling was resumed.

Another well, in Wayne County, Miss., was drilled to a depth of 6555 feet and 9⅝-inch casing was set and cemented at 6310 feet. Before drilling the cement plug in the 9⅝-inch casing, the mud was converted to a lime-base drilling fluid with 10 percent diesel oil, and starch was added while drilling to reduce the water loss.

Salt was encountered at a depth of 13,600 feet and the lime-starch-oil emulsion mud was maintained to a depth of 13,745 feet, at which time the mud was converted to a saturated salt, oil emulsion drilling fluid. The well was drilled to a depth of 13,941 feet in salt and the drill pipe was stuck at 13,920 feet while trying to make a connection. There seemed to be some type of movement in the salt while reaming or pulling out of the hole, which had a tendency to stick the drill pipe, so it was decided to build the mud weight to 13.0 ppg in an effort to overcome this condition. Returns were lost upon reaching a mud weight of 12.6 ppg and this zone of loss was found with the aid of a spinner survey.

A bentonite-diesel oil squeeze was made. The procedure for squeezing was as follows:

The 3½-inch drill pipe was run open-ended to 13,445 feet and filled with 3 barrels diesel oil, 40 barrels diesel oil-bentonite mixture containing 16 pounds per barrel of mica and chopped cellophane, 3 barrels diesel oil, and 54 barrels of mud. At this point, the blowout preventer rams were closed and one truck pumped through the annulus while the other truck pumped through the drill pipe. The mixture of diesel oil-bentonite was displaced with 3 barrels of diesel oil ahead and 1 barrel diesel oil behind, while pumping 12 barrels of the saturated-salt, oil emulsion drilling mud through the annulus—a ratio of 3.67 to 1. Casing pressures were recorded for each 5 barrels of diesel oil-bentonite mixture pumped in at a rate of 2 barrels per minute. The casing pressures were as follows:

| Barrels Mud Displaced into Drill Pipe | Casing Pressure psi |
|---|---|
| 0-5 | 600 |
| 5-10 | 900 |
| 10-13 | 1200 |
| 13-15 | 800 |
| 15-20 | 750 |
| 20-25 | 800 |
| 25-30 | 825 |
| 30-35 | 800 |
| 35-40 | 775 |

As soon as the pump was shut down the casing pressure dropped to 700 psi and the pressure was released on the annulus and the drill pipe, recovering 15 barrels of mud from the annulus and none from the drill pipe. The drill pipe was pulled to pick up a bit and drill collars and the hole was reamed from the top of the

plug at 13,213 to 13,618 feet. Drilling was resumed successfully.

**Suggested Squeeze Procedure.** It is essential to this method that the point of loss be established at least generally, prior to its performance. The temperature survey[3] has proved to be helpful in this regard although other methods such as spinner surveys, thermister surveys, etc. have been frequently employed. Once a loss zone is located the bentonite diesel oil squeeze usually shows good results in sealing it off. Certain procedures should be followed, however, to gain the best results.

**1.** If the weight of the mud in the hole is 11.0 ppg or higher, the drill pipe should be placed at the bottom of the casing, open ended, and a back pressure valve added in the string. Then the desired amount of bentonite-diesel oil (BDO) mixture is mixed in 10-barrel batches in a cementing truck, using a regular cement hopper to do the mixing. Although two trucks are usually present to do such a squeeze, it usually is quicker to use only one side of one truck for this operation due to the difficulty of cleaning up the trucks after mixing this material.

Each 10-barrel batch contains about 300 pounds per barrel of bentonite and about 12 pounds per barrel of sealing material. As each batch is mixed it is pumped into the drill pipe until the desired volume has been mixed. The following material makes up a typical 10-barrel batch of BDO of 11 ppg density:

7½ barrels diesel oil
21 sacks bentonite
50 lbs. coarse mica
50 lbs. fine mica
25 lbs. chopped cellophane

(Other sealing materials may be substituted; recent tests have made the use of granular materials appear promising.)

The number of batches mixed is dependent both on the severity and depth of loss. Generally, in shallow losses less BDO is used. About 40 barrels would be an average amount. Sufficient diesel oil should be ordered to allow for about 3 barrels of oil pumped ahead of the foregoing mixture and 3 barrels behind, to act as a spacer and prevent any contact with the mud in the drill pipe. Also, about 3 or 4 barrels of diesel oil are required to clean the truck tank and flush out the pumps.

**2.** When the BDO mixture has been pumped into the drill pipe it is displaced until about 1 barrel of oil spacer ahead of the mixture is on the outside. This is done by the second truck while the mixing truck is cleaning up.

If the loss is relatively shallow and the drill pipe capacity is too small to hold all of the desired BDO volume, then the drill pipe should be pumped full of mix with the oil spacer ahead as before, and the remainder of the mixture mixed and displaced after lowering the drill pipe to the proper depth. This last amount of BDO is displaced while actually squeezing the well.

**3.** When both trucks are ready, the drill pipe (still open ended) is run into the open hole until it is about 30 to 100 feet above the point of loss as determined previously. If more than one point of loss is indicated, the uppermost loss zone should be squeezed first.

Blank pipe (without casing protectors) should be used to go in the hole if a blowout preventer suitable for stripping is in use in order that the pipe can be stripped back up into the casing under pressure. The use of this type of preventer is not absolutely essential to the operation but it is considered best to hold the final pressure while pulling pipe into the casing after a squeeze to prevent flowback.

**4.** If the annulus is full of mud at this point the preventer suitable for stripping is closed on the drill pipe. If not, and there is reason to think that the hole will not stand full of mud, then water should be used to fill the hole, estimating as closely as possible the amount of water used. This may be necessary to figure the desired final squeeze pressure.

If water is used to fill the annulus, then the truck which is used to pump on the annulus during the squeeze should use water instead of mud. It will be also necessary at this point to fill up the drill pipe with mud, due to the back pressure valve in the string.

**5.** Since the BDO mixture weighs approximately 11.0 ppg there is a possibility that it will fall out of the drill pipe when the fluid in the annulus is less than 11.0 ppg. Therefore, in a case of this sort, it may be wiser to place the drill pipe about 30 to 100 feet above the loss zone while displacing the bentonite-diesel oil mixture rather than doing this operation up in the casing.

**6.** With the annulus and the drill pipe filled and the well closed in, squeeze operations can proceed. At this stage one truck should be on the drill pipe and the other tied into the casing. During the squeeze each truck pumps simultaneously, the pumping rate of each being dependent upon several factors. Normally, a ratio of about 4 barrels of diesel oil-bentonite to 1 barrel of mud is the best mixture, but this may be varied. It is usually undesirable to place any more pressure on the open hole than necessary, and in some cases the above ratio may be as high as 8 to 1.

To achieve maximum pressure, a ratio of about 2 to 1 is considered best. By watching the casing pressure closely it is possible to vary this ratio during a job to suit the situation. If the operation is started at an 8 to 1 ratio, the pressure build up will be slow and there is little likelihood of excessive final squeeze pressure.

If, during the squeeze, it appears that the desired final pressure will not be attained then the ratio may be changed toward 4 to 1 or even 2 to 1, to strengthen the mixture. It is usually undesirable to displace the BDO mixture at a rate higher than 2 to 3 barrels per minute, and usually at a slower rate near the end of the squeeze.

**7.** During the actual squeeze operation the pipe should be worked back and forth through the preventer at least once every 4 to 5 minutes. If the bentonite mixture should turn up around the drill pipe and come up in the hole, it can be detected in this manner by means of the weight indicator. This may be either due to misjudging the point of loss and placing the drill pipe below it, or as is generally the case, be caused by a breakdown in the formation higher in the hole because of an excessive pressure buildup in the open hole.

In any event, when this occurs it is futile to attempt to squeeze further at this point, since inadequate mixing results in such cases. Also, the volume of squeeze material may be insufficient to reach to the breakdown point. It is best, therefore, when this happens, to stop the squeeze, pull up at least 50 feet above the point where the drill pipe is free and then complete the squeeze in the same manner as before.

Another indication that the squeeze

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mixture is coming up around the drill pipe is given when at any time pumping is stopped, considerable pressure remains on the drill pipe, while the casing pressure remains zero. (Allowance for any hydrostatic pressure differential due to a difference in the weight of the BDO in the drill pipe and the mud on the outside should be made.)

**8.** In cases where no increase in mud density is anticipated, the final casing squeeze pressure should not exceed 200 to 300 psi. If later mud density increases are expected, the maximum squeeze pressure plus the hydrostatic pressure at the time of the squeeze should not exceed the hydrostatic pressure exerted by the highest expected mud density.

These hydrostatic pressures must be based on the depth of the loss and the squeeze pressures must be read from a gage on the casing. To exceed this value of squeeze pressure would be equivalent to exposing the open hole to mud densities greater than required.

**9.** After the squeeze has been completed the pipe should be stripped out through the preventer under pressure. This pressure is maintained by the cement truck on the casing. The truck should pump in just enough mud in the annulus to replace the volume of the drill pipe, making allowance for pulling the wet pipe.

Care must be taken not to exceed the final squeeze pressure, and it is preferable to stay at least 50 to 100 psi under the final pressure.

**10.** If the pipe cannot be stripped out under pressure the final pressure, less a small amount, should be reimposed after pulling the pipe up in the casing.

**11.** After the drill pipe has been pulled back into the casing the well should remain closed in, under pressure if possible, for at least 3 hours. Then circulation from the bottom of the casing for a period of about 2 hours is desirable before making a trip to put on a bit or until the mud has been conditioned properly, which might require additional time. The main purpose of this circulation period is to check on the ability of the hole to stand circulation.

**12.** In reaming operations after making a trip at least 15 minutes should be required to ream 1 joint of pipe through the BDO plug. The hole should be pumped clean at least once every 6 joints. The hole should be reamed with a mud weight no higher than that required to control formation pressures already penetrated.

**13.** If the hole cannot be filled, an alternate technique would be to set a packer at the bottom of the casing or, if possible, about 100 feet above the zone of loss. Then displace both mud and BDO down the drill pipe in alternate slugs of about 20 BDO to 5 of mud.

One or 2-barrel oil spacers should be used between slugs. Mixing of the materials would be accomplished as they travel down the hole but it is doubtful that the mixture could be displaced more than 100 to 200 feet below the packer without becoming too viscous to flow.

Although the above procedure is primarily based on the use of two cement trucks, several squeezes have been performed using only one truck. In such a case, the BDO is mixed and pumped from one measuring tank and mud is pumped from the opposite tank using the second pump.

The use of open ended drill pipe probably gives inadequate mixing of the BDO and mud. It has been run in this manner in open hole to reduce the risk involved in case the mixture should come up the hole around the drill pipe due to misinterpreting the point of loss or to a formation breakdown above the initial loss during the squeeze operation.

On one well where this occurred, the BDO came up approximately 900 feet around the drill pipe. In this instance it required 100,000 pounds above the weight of the drill pipe to pull free. Generally mixing is poor in such a case also, and the resulting mixture does not have the strength that it would normally possess. The use of a perforated closed end nipple on the bottom of the drill pipe would probably result in better mixing at no increase in risk.

Other mixtures such as gypsum cement in oil, and a combination of bentonite and cement in oil have been tried also. The use of a gypsum-oil suspension appears promising in cavernous or porous formations where formation water flow is suspected.

Some operators have found that a combination plug using both a

bentonite-diesel oil plug and cement has given good results in some cases of severe loss, particularly in highly porous or cavernous formations. In such cases, from 20 to 40 barrels of BDO mix precedes a cement plug in order to get a bridging action ahead of the cement.

It is difficult to convey a mental picture of the great affinity of bentonite for water and of the degree of hardening which may result from the mixture described. However, it can be reported that as much as 8000 pounds of bit weight have been used in some instances to slowly ream out a mixture left in the hole after a squeeze. In another instance, drill pipe was accidentally plugged and 7000 psi pump pressure would not clear a stand. The material was cleared from a joint of pipe with 3000 psi pressure.

Records of the company with which the authors are associated show that 53 BDO squeezes have been performed in the Gulf Coast area. In 79 percent of these, full circulation was established after reaming out the squeeze. In 5 percent no weight increase was attempted. In 42 percent of the total, increases in mud density over that in use at the time of the loss were possible. On 17 percent of the instances where a loss occurred after a squeeze, the loss was later proven to be at a new point in the hole.

This performance becomes more remarkable when it is realized that in most instances these squeezes were made for losses which the common sealing agents failed to remedy. Certain other factors make this tabulation unfair to the method. Sometimes losses occur at new points in the well, and if not located, are assumed to indicate failure of the preceding squeeze. Further, squeezes have been performed on the assumption that new losses had developed at old points, and where this was not correct, the squeezes were foredoomed to failure. —**The End**


ACKNOWLEDGMENT

The author wish to express appreciation to the management of Gulf Oil Corporation for permission to publish this paper.

Applications for U. S. and foreign patents have been filed on this development and a service company has been licensed to apply the techn'que for others.


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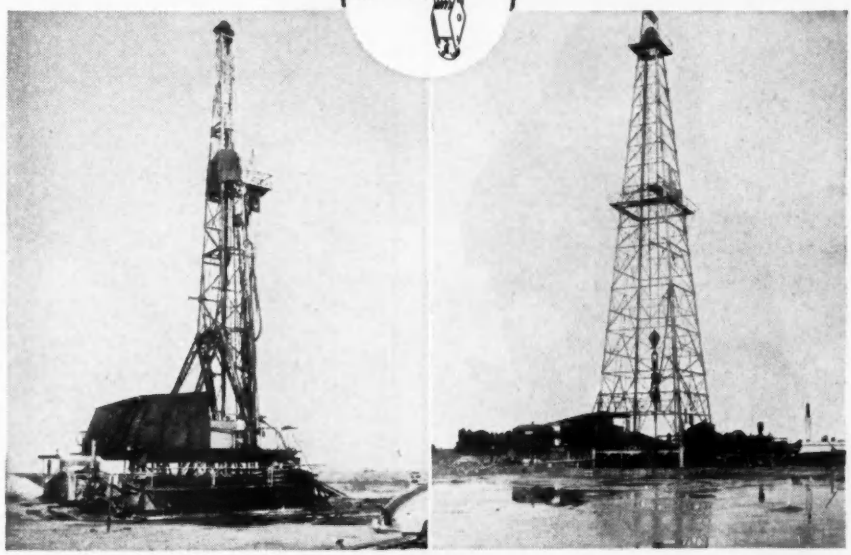
[3] Dawson, D. D. Jr. and Goins, W. C. Jr., "Temperature Surveys To Locate Zone Of Lost Circulation," *Oil & Gas Journal*, June 22, 1953.



**On Jackknife Rigs** **On Standard Rigs**



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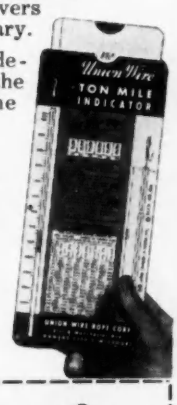


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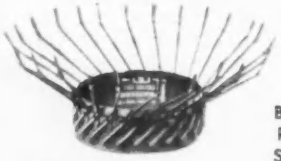

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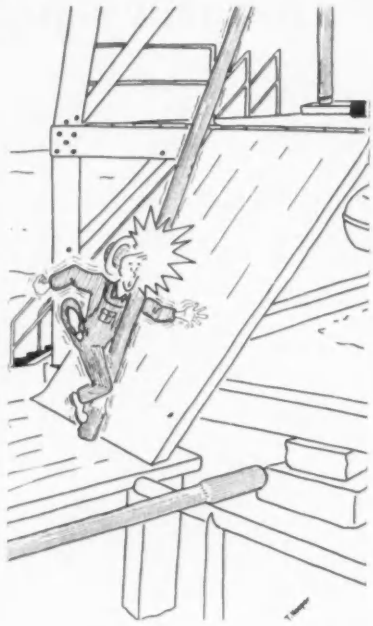

## It's easy to get hurt!

**Editor's Note:** *It is axiomatic in the industry that accidents seldom happen on unusually hazardous jobs. It is the easy, routine task that invites carelessness and causes injuries. This is another in a series of pictorial safety messages taken directly from the files of companies in the drilling industry. Clip them. Put them on your bulletin board. Drive home the warning that IT'S EASY TO GET HURT!*

**The Accident:** Prior to making a connection, two men decided to pick up a joint and place it in the rathole. One man got on the cathead and the other took the catline and hooked on to the joint in the pipe-rack runway. The man on the cathead picked up on the joint too quickly, and the man on the runway tried to tail the pipe. The leading end of the joint caught in the derrick "A" door, stopping the joint too suddenly and causing the man tailing to slam against it, injuring his head.

**Recommendation:** Place experienced man on the cathead at all times. A third man should have assisted in the operation by standing in the "A" door, or to the side of it, where he could see both men and direct the operation.


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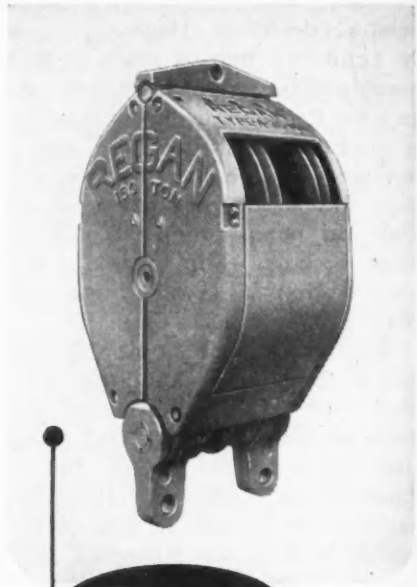


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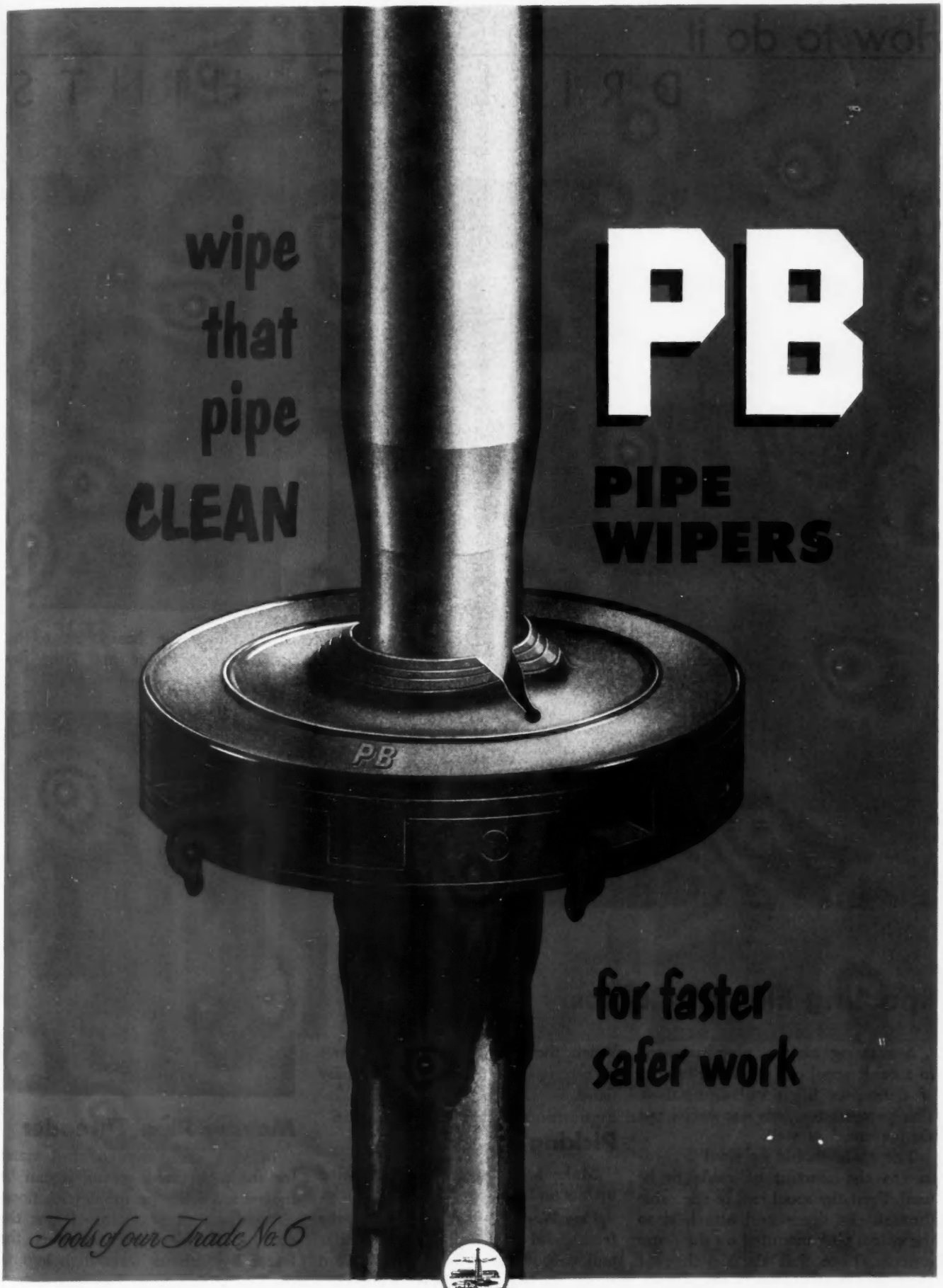


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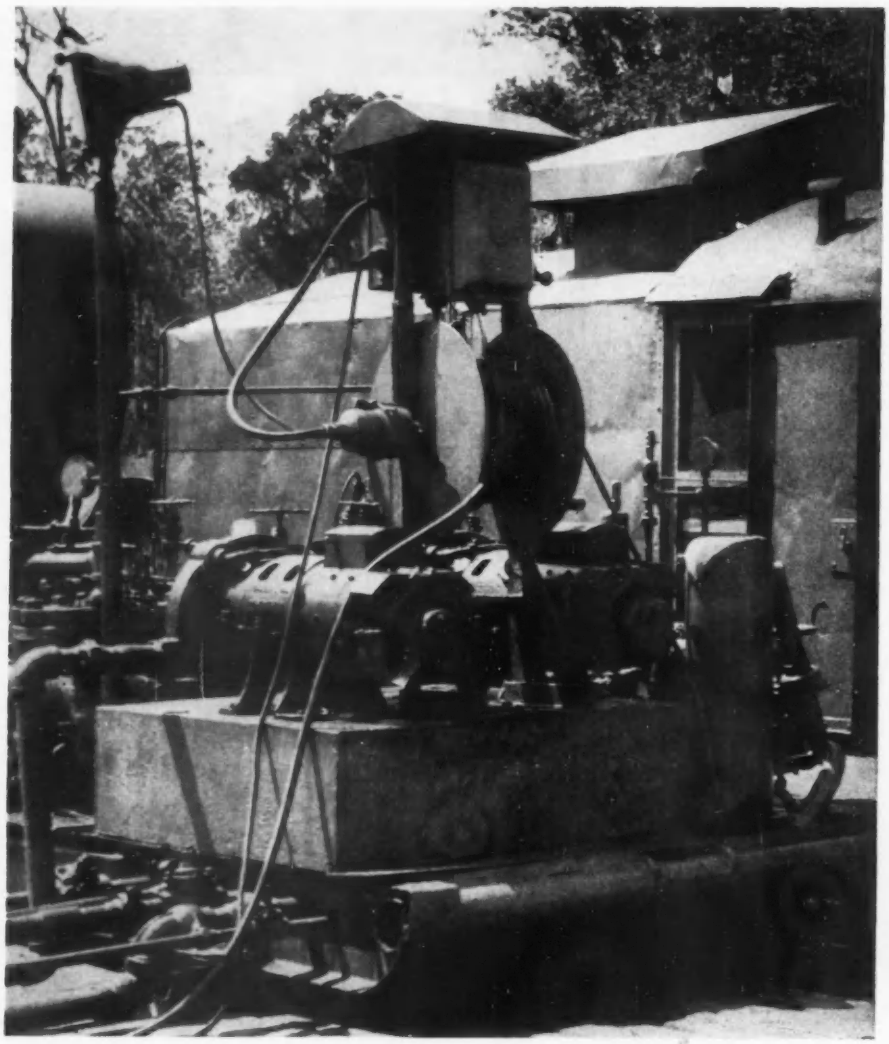


## Spooling Electric Cables

A rotating electric plug mounted to a cable spool can eliminate tangles of dangerous high voltage cables. This protects not only the cable, but rig personnel as well.

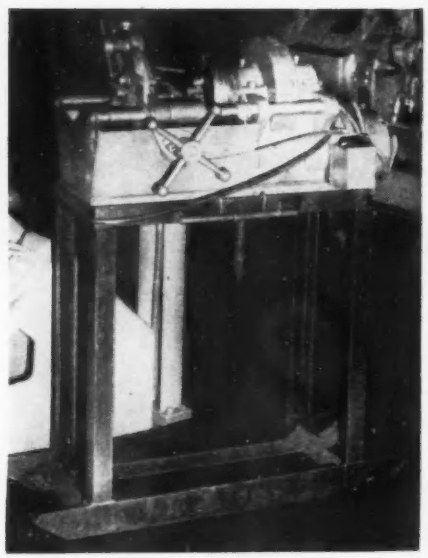
The spool should be sized according to the amount of cable to be used. Feed the spool end of the cable through the drum and attach it to the swivel plug mounted on the drum support. Note that the switch gear above the spool shown in the accompanying illustration is protected from rain by a light gage metal roof. When the cable on the unit is not in use, it is reeled on the drum by hand.

## Picking Up Bits

Make a lifting device for picking up bits and save crew members' backs.

One West Texas contractor cut the female end from a cracked drill collar and welded the ends of a bolt, bent in the shape of a triangle, to the sides of the collar. By screwing onto a bit, a convenient pickup tool is provided

which allows the heavy bit to be raised or lowered to and from the derrick floor by the catline.



## Moving Pipe Threader

Build a skid-mounted steel stand for the pipe threader and it can be moved anywhere on the derrick floor.

Weld a steel angle iron frame the size of threader base. Support the frame by welding waist-high legs to the frame and to a skid base below.

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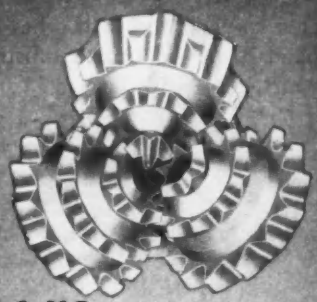
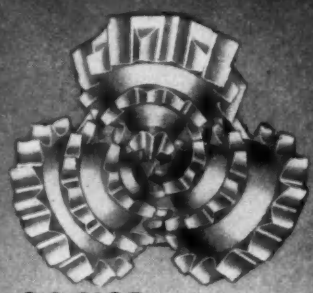


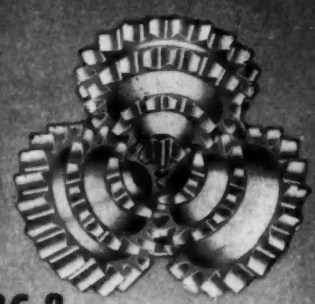
**3C-K2**

A long-tooth bit which is giving excellent results in softer formations streaked with harder strata. Best adapted for drilling top shales, chalks, salt, consolidated sands and some limes.



**3C-K2P**

A rugged, fast-digging bit for use in medium to hard shales, chalk, red beds, limes and some conglomerates. Handles well at a variety of rotary speeds and weights.



**3C-2**

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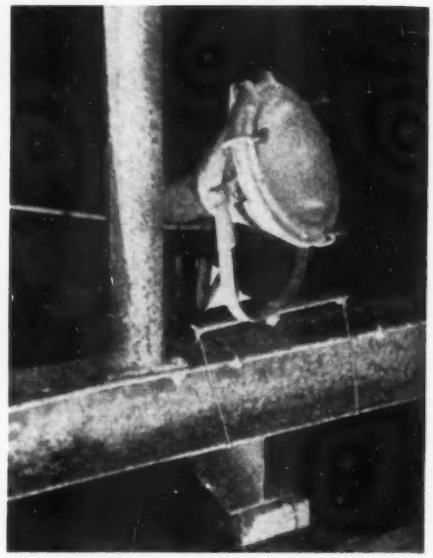
## Supporting Ramp

Make a nipple or scrap box, skid mount it and use as a support for the pipe ramp. The most often used tool box around a rig is a scrap pile box. One contractor in the Gulf Coast welded side rails of two-inch pipe on a steel skid base, affixed a steel bottom, then covered a portion of the top with sheet metal to provide a support for the pipe ramp.

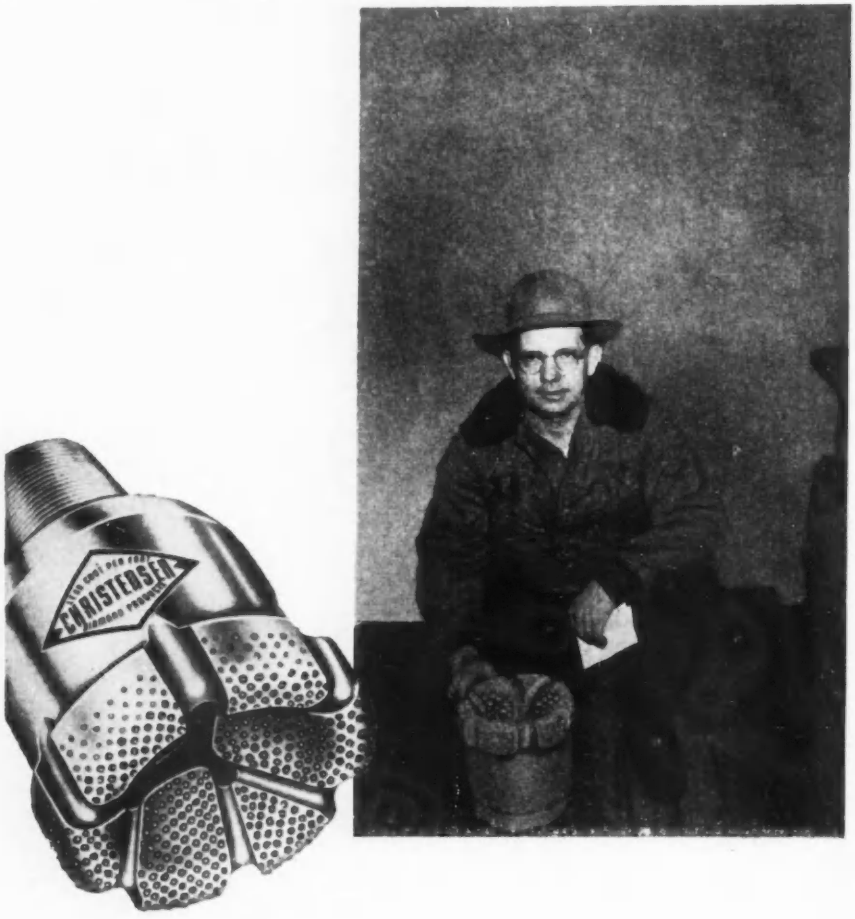
The junk box is out of the way, yet is convenient for storing the many items so easily lost around a rig. A short steel step is welded to top rail of box enabling crewmen to climb to pipe walk without difficulty.

## Mounting Rig Lights

For safety and maintenance sake, a rig must be well lighted and sources of light must be strategically located. Rig lights must be mounted in such a way that they do not interfere with the work or the workmen.



Make a mount for below-floor rig lights from a small steel bar and two wires. The light is bolted to the center of the bar and the two wires connected to each end of the bar can be hooked to any desirable substructure support.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This and hundreds of actual case histories mean one thing to you — experience, our experience to improve the bit and to better determine the right type for your specific drilling problem.

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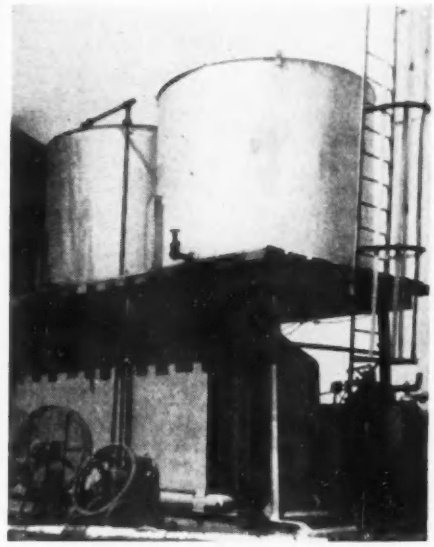
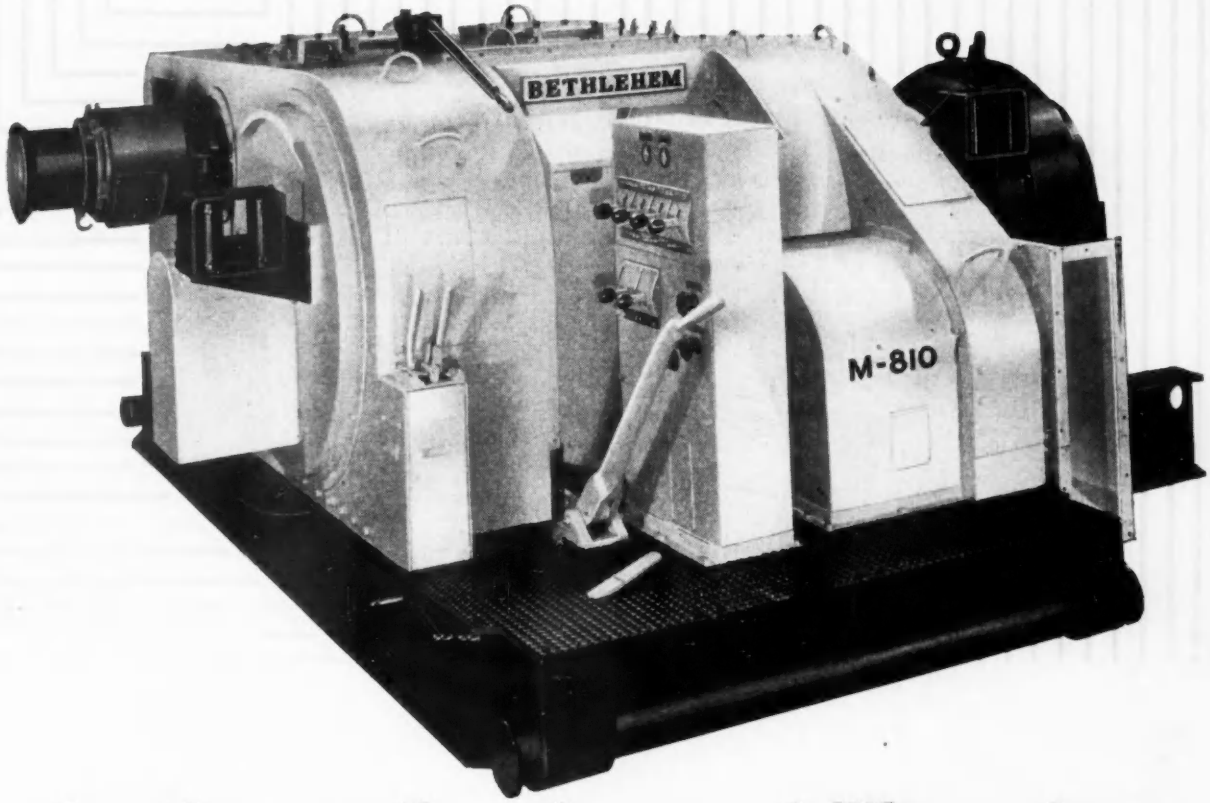


## Transporting Bunk House

A skid mounted bunk house with an overhead platform for fuel tanks provides a compact unit which is convenient and easily transported.

Build a rectangular steel frame the

# *A New, Powerful* DRAWWORKS




# in the medium-heavy drilling class

Meet Bethlehem's M-810—a smooth, power-packed drawworks built for work in the medium-heavy drilling range. It's a rig that hasn't been hurried along; we spent years designing, testing, and checking the pilot model before the M-810 was released for production.

This is a tough, sturdy rig equipped with mechanical drive, fluid coupling, or torque converter—whichever you choose. It's a rig with tremendous clutch capacity (low-speed drum clutch, 102,000 ft-lb). Compare this with the figure you'll find in competitive rigs of the same class!

The M-810 has other fine features, too—features that help make the going easier, less costly. For instance:

- Extra-large, extra-powerful brakes cooled by enclosed circulating-water system
- 2- or 3-engine drive with single or double pump drive
- Disconnecting Airflex clutch-controlled pump drives
- Big, strong shafts throughout; short bearing centers
- Engine compound and drawworks transmission clutches of disengaging spline type; master and high- and low-speed drum-drive clutches of extra-high-capacity air friction type

The M-810 is a highly flexible rig that permits a wide latitude in the choice of engines and engine combinations. Moreover, it's designed for easy moving from place to place; the engine compound is a sectionalized type, and the width of the drawworks is well within required road limits.

You are invited to see and inspect this new, high-speed drawworks. Take all the time you want; there are many details you'll need to know, and we'll be glad to explain them fully.

BETHLEHEM STEEL

**BETHLEHEM SUPPLY COMPANY**

*General Offices:* 21 E. Second St., Tulsa, Okla.
*West Coast Headquarters:* Los Angeles, Calif.
*Export Distributor:* Bethlehem Steel Export Corporation
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*Canadian Representative:* Rocky Mountain Supply Co., Ltd.
Calgary, Alberta

same size as the bunk house skids. Weld it to six I beam legs which are attached to the skid base of the bunk house.

Bolt a floor of two-inch wood stock to the frame and mount the water or fuel tanks on the platform so that they may be moved as a unit. All piping should be securely fastened so as not to be damaged in transit. Weld a steel ladder to the end of the skid and platform for accessibility to overhead tanks.

## Increasing Leverage

Time and many steps are saved by installing auxiliary valve turning devices between decks of Gulf Coast drilling barges. One such device can be made with minimum effort, yet provide much benefit to the crew, because a valve on the second deck can be turned from the deck above.

Weld an inverted Y connection to a 25-foot length of sucker rod and to a valve wheel. Properly brace the rod where it passes through superstructure. A short piece of the rod is welded on top of the shaft in shape of a T to provide a turning handle.

FLOLIGHT IS THE BEST PICK IN
Rig Lights
"FLOLIGHT" RIG LIGHTS
VAPOR PROOF DERRICK LIGHTING EQUIPMENT
FABRICATED TO FIT ALL SIZES AND TYPES OF
DERRICKS AND MASTS
"IT'S QUICK TO RIG UP"
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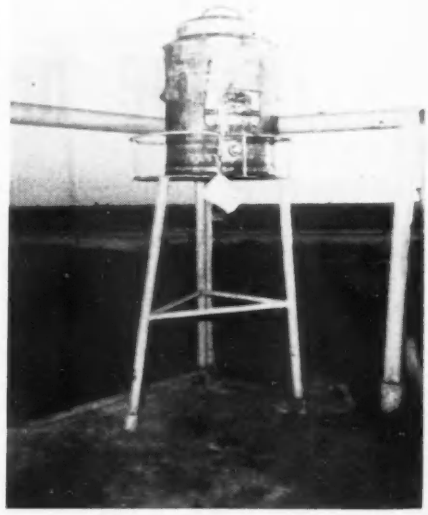


## Making Cooler Stand

Make a three-legged water cooler stand from scrap material around the rig and dividends will be repaid through convenience to your crew. Made from six pieces of sucker rods or small diameter pipe, a boiler plate 30 inches in diameter and some welding rod, this stand can be readily constructed.

One Gulf Coast operator welded

you
BUCYRUS
ERIE
FIRST
with the
Finest
in
Spudders

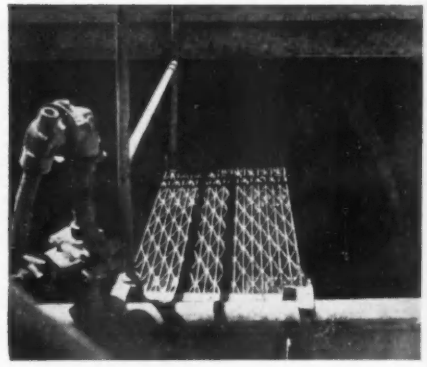
three lengths of one-inch pipe or heavy sucker rods of sufficient length to make a convenient height to a ¼-inch boiler plate cut to a 30-inch diameter. Three smaller size sucker rods were used to form reinforcements to the legs. Welding rods or large gauge wire were welded to form a guard rail around the circumference of the stand. One-inch pipe collars can be welded to the derrick floor so the pipe legs can be secured. The water container is placed with the spigot in the position shown.

## Moving Equipment on Skids

Make a flat skid for the blowout preventers and other auxiliary equipment and save time and space on moves.

One company in New Mexico has fabricated a skid of lengths of pipe and tank steel, using the pipe for the framework and the steel as the floor of the skid.

Removable pipe side rails are installed through the supports shown.



## Constructing Walkway

Construct a mud tank walkway to permit dumping of weighting material directly into the pump suction without waste.

The walkway is placed directly above the outlet of the pump suction which is circulating mud in the hole. Weighting material is piled on the walk and at a signal from the driller or derrickman, it is dropped directly into the suction and pumped down the hole until it is near the bottom of the pipe. Then the pump is shut down and the trip is started. When the operation is timed down the hole correctly, the crew will pull a "dry string" of pipe. The slug tank idea is helpful in Gulf Coast drilling.

To construct the walkway, affix flanges to each of the four corners of a metal strip which is latticed to prevent slipping. As an added safety measure, weld a simple handrail of small pipe as illustrated.


AN *Amelioration

IN LOST CIRCULATION PROBLEMS

SEAL OF APPROVAL 1953 For Advanced Achievement

*Amelioration, according to the dictionary is a "betterment and/or improvement". This definitely applies to Kingseal and Queenseal regarding lost circulation materials, as these products were deliberately designed to—CAULK—"To make tight by filling a crevice".

The strong resilient textile fibers of Kingseal and the flexible, impervious wood fibers of Queenseal, flex and pack into an interstice in the form of a tailored plug, permanently sealing and caulking.

NOW—The trailer as shown above is a mobile unit, containing equipment specifically designed to stop "Complete Mud Losses" in the cavernous or fissure areas. Manned by hydraulic and displacement experts, this unit introduces an entirely new method and technique, rapidly revolutionizing the lost circulation field and correcting this costly and exasperating problem.

The William E. Sievers Corporation and Sievers Company internationally specialize in "Lost Circulation". Their variations of applications, special injection equipment, complementary chemicals, mixtures and processes certainly have caused "An AMELIORATON" in the perplexing lost circulation problems. Their services are available at your inquiry.

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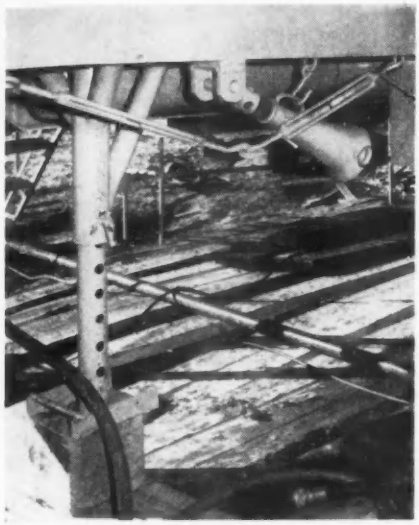
Kingseal and Queenseal are available *at your specification* from most mud service companies



## Leveling Structures

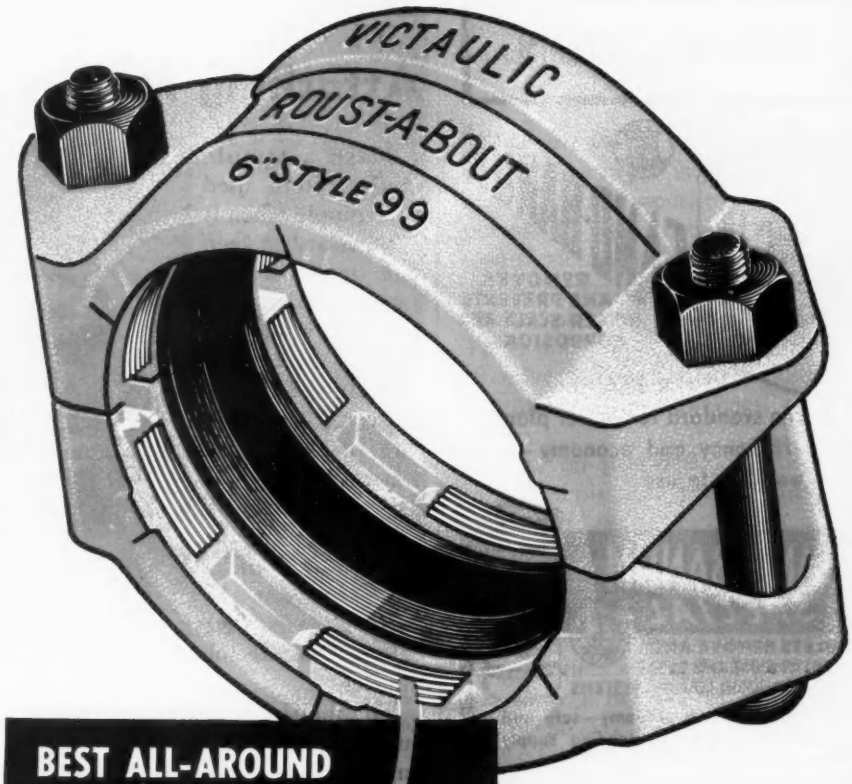
The job of leveling workover rigs can be greatly implemented if a screw-type jack is suspended from a hinged bracket, where the jack can be swung out of the way during moves.

Weld a bracket, shaped like a C-clamp, to the underside of a substructure member. Bore a hole one-inch in diameter through the wings of the yoke. Slip a steel pin through the bore and through a leverage hole of the screw jack. The jack pivots on the pin connection and can be swung out of position at will.

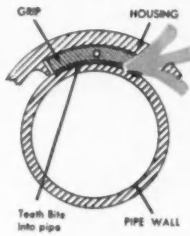
Weld a metal hook to the frame as shown. This hook is made from small diameter bar steel. Hook the jack by the handle.

### Want to make some easy money?

**• Are you proud of an idea which makes your job easier . . . saves money . . . or time? Well here's a chance to let others in on it . . . and at the same time pick up some cash for your efforts. Just snap a picture of the timesaver. Send us the picture along with a penciled description. We'll do the rest. Just address your idea to the Drilling Hints Editor, WORLD OIL, Post Office Box 2608, Houston 1, Texas.**


**BEST ALL-AROUND PLAIN END PIPE COUPLING ON THE MARKET!**




**HERE'S WHY...** *The Roust-A-Bout grips (teeth) take a strong, positive, circumferential bite on the pipe—as does a Tubing or Pipe Slip. The curved grips assure maximum gripping area for greatest holding power. This is the exclusive Roust-A-Bout, bull dog grip.*

Why accept less than the best when you are using plain end pipe couplings? Victaulic Roust-A-Bouts are specially engineered to provide the most reliable pipe connections you can use. With inclined, curved grips they bite into pipe circumference—provide a far stronger and surer hold.

Roust-A-Bout Couplings are just what the name implies—reliable, sturdy, adaptable and ingenious—ready for those tough field jobs where only plain end pipe is used or where the simple Victaulic Groove Method is not quickly available.

**Victaulic Roust-A-Bouts are quick and easy to install: . . .**

- You *cut* and *couple* your pipe as you go!
- You can use *plain* or *beveled end* pipe!
- You can use *new* or *used* pipe!
- For use on *permanent* piping or *repair* work!
- You need only one tool—a *socket wrench!*
- Roust-A-Bouts are simple and factory finished!

**For your next job—insist on the best**—Victaulic Roust-A-Bouts. They're available at all Victaulic Stocking Supply Houses in pipe sizes—2", 2½", 3", 3½", 4", 5", 6", and 8".

**Write today for the Victaulic Roust-A-Bout Catalog No. 44-81**

**VICTAULIC COMPANY OF AMERICA • P. O. BOX 509 • ELIZABETH, N. J.**

Office and Plant: 1100 Morris Ave., Union, N.J. • Telephone Elizabeth 4-2141
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TABLETS REMOVE AND PREVENT RUST AND SCALE IN ALL RADIATOR COOLING SYSTEMS

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You Need this Hopper on your Rig

A BEMCO Mud and Cement Hopper lets your crews mix dry materials *when they need them*, without waiting for trucks or other mixing equipment.

The hopper is made of heavy steel sheet with a reinforcing bead around the top; table is designed for fast dumping and is equipped with a revolving cutter; jet chamber provides perfect mixing of all materials.

Order your BEMCO Hopper today . . . and it will probably start paying dividends tomorrow.

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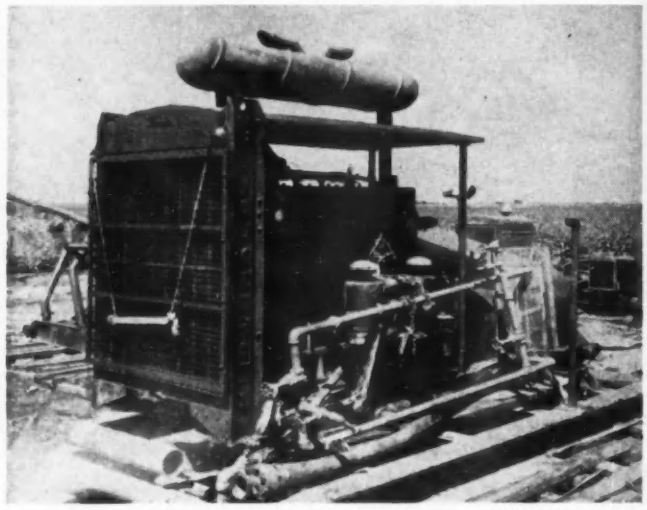
# Attaching Muffler to Engine



Make a simple muffler from used pipe nipple when it is necessary to keep the muffler attached to the engine for quick rigging up. Mount the muffler directly above the engine on two pipe nipples leading from the exhaust manifold. The pipe nipples support the muffler and conduct the exhaust gases from the manifold to the muffler.

The muffler is fabricated with two outlets to prevent any back pressure on the exhaust valves. The pipes are the same size as those leading from the engine. Two forty-five degree mitre welds are made so that the ends of the pipes are horizontal, thus preventing rain water from entering the muffler when the engine is idle.

The ends of the muffler are closed by a bull plug made from the same size pipe.

you play it SAFE with Safety-Pulls

Just as important as the time- and labor-saving advantages of Coffing Safety-Pull Ratchet Lever Hoists is the way each one protects your men from injury . . . your equipment from damage. Here's why:

Load cannot slip even if handle is accidentally released — because of dual Ratchet and Pawl principle, developed by Coffing and an outstanding Coffing advantage for over a quarter of a century.

Load is held positively at all times — there is no friction brake to slip or freeze.

Hooks will not break or straighten out.

"Safety-valve" handle will bend before any other part of hoist gives way.

Safety-Pulls are single-chain tested at 100 percent above warranted, rated capacity.

Find out more about how Coffing Safety-Pulls provide extra protection on the job. Write for Bulletin 010SP.

Coffing Safety Pull Ratchet Lever Hoists
2 coil chain models, ¾ and 1½ tons
10 roller chain models, ¾ to 15 tons

Quik-Lift Electric Hoists
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COFFING HOIST COMPANY
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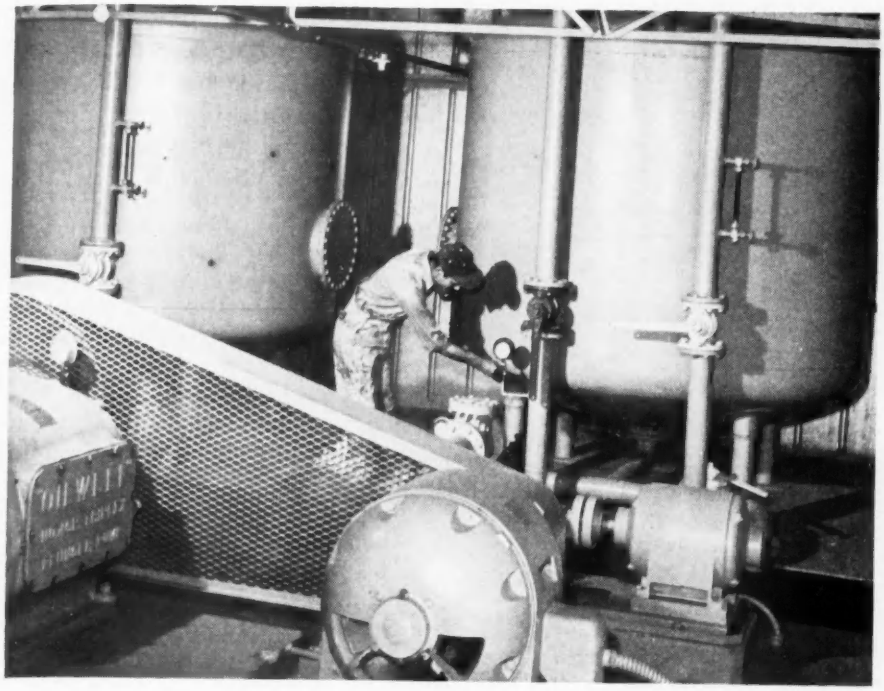


**INTERIOR OF FILTER AND PUMP HOUSE** showing dual rapid sand filters and back wash pump and motor in front of left filter. Triplex plunger pump to inject flood water is driven by 75-horsepower electrical motor in foreground.

# Water-Flood Restores Youth To Old West Texas Lease

**Sunray's modern methods increase production 16 fold in 16 months. Next year's output expected to reach levels of flush period 25 years ago.**

**By J. E. KASTROP,** WORLD OIL Staff

MOST RECENT addition to the growing list of highly successful water-flood projects in West Texas is that of Sunray Oil Corporation's Dora Roberts Lease in the Howard-Glasscock field of Howard County. In just 16 months from time a pilot flood was initiated in February, 1952, production from the Yates sand was increased 16-fold. Cumulative totals indicate that up to June, 1953, one barrel of oil has been produced for every 2.757 barrels of water injected into the Yates sand.

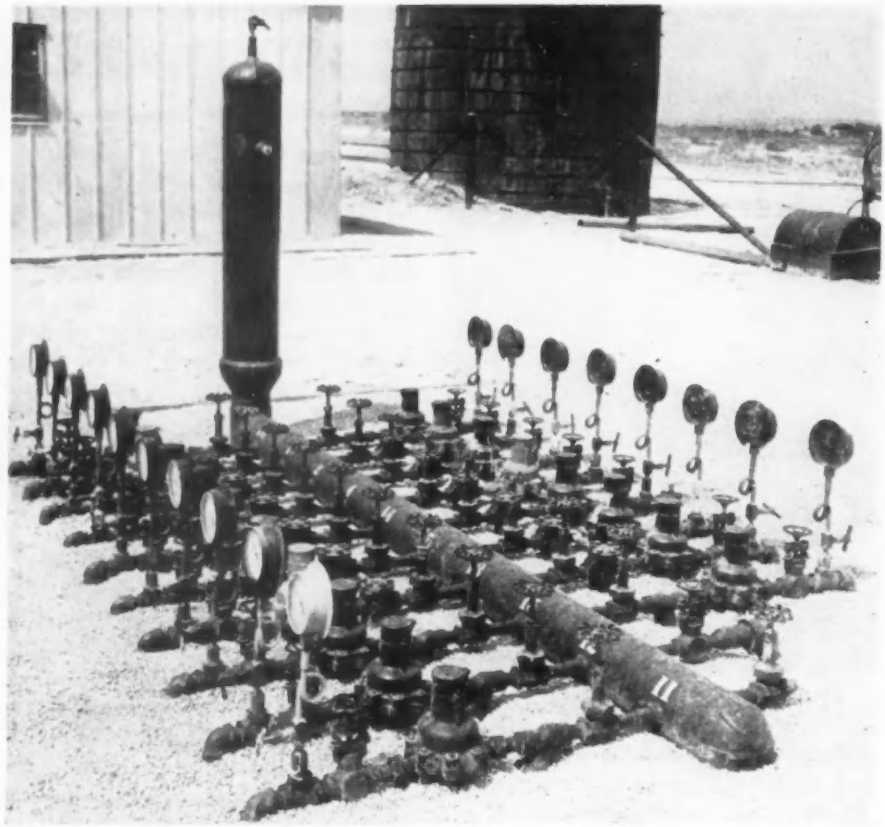
The Howard-Glasscock field was discovered in 1928 and was known then as the Big Spring field. Located about 16 miles south of Big Spring, Texas, the field lies mostly in Howard County, with the north part of the field in Glasscock County. There are four pay zones in the field: (1) Yates sand or 1400-foot zone; (2) Seven Rivers sand, or the 1800-foot zone; (3) San Andres section of the Permian lime, or the 2600-foot zone; and (4) San Angelo-Clear Fork section of the Permian lime, or the 3000-foot zone. Sunray's Dora Roberts lease comprises 480 acres, being the north half of Section 136 and the northwest quarter of Section 137 in the W&NW Survey of Block 29 in Howard County.

**Reservoir Data.** The Yates sand, or 1400-foot zone, is approximately 100 feet thick and consists of sand, and occasional shale breaks. Actual porous sections are lenticular in nature, due to cementation of the sand, shale breaks or a combination of both. These impervious beds reduce the net effective pay section to an estimated weighted average thickness of about 29 feet.

Reservoir properties obtained from core analysis are: permeability, 41.3 milidarcys; porosity, 20 percent; residual oil saturation after water-flooding, 18.4 percent; and connate water saturation was estimated at 40 percent. An isopach map prepared from drillers' logs and radioactive logs show a net pay of 11,003 acre-feet or an average of 27 feet of net pay sand for 418 producing acres. Cross sections also prepared from drillers' logs, radioactive logs and core logs show that two sand stringers separated by shale breaks exist on the B lease, while a fairly uniform body of sand is predominant on the D and E leases. There is evidence of many shale breaks throughout the Yates sand, but the main producing sand body is present in every well. The oil-water contact has been established at approximately plus 1380 feet. Exclusion of bottom water by plug back jobs to a point above plus 1380 feet in some wells was done by dumping a resinous plug in the bottom of the well to prevent possible water channeling through the bottom zone.

**Pilot Flood.** The pilot flood originally included 85 acres located on the best portion of the lease. Four new injection wells were drilled, and three old producers were converted to injection wells, making a total of seven injection wells for the pilot flood. Injection wells were located on a five-spot pattern on ten-acre spacing to effect 14 producing wells.

Input wells were drilled with a low water-loss mud, ranging from 10 to 15 cubic centimeters on the standard API filtration test. Wells were drilled to a total depth with 6¾-inch bits. A packer-type shoe was used on the bottom of 4½-inch pipe which was set at the top of the Yates sand and cemented with about 50 sacks of



**INJECTION MANIFOLD** which distributes flood water to each injection well. Meter valve on each line permits adjustments for volume desired in each input well. Positive displacement meter measures water input volume per well.

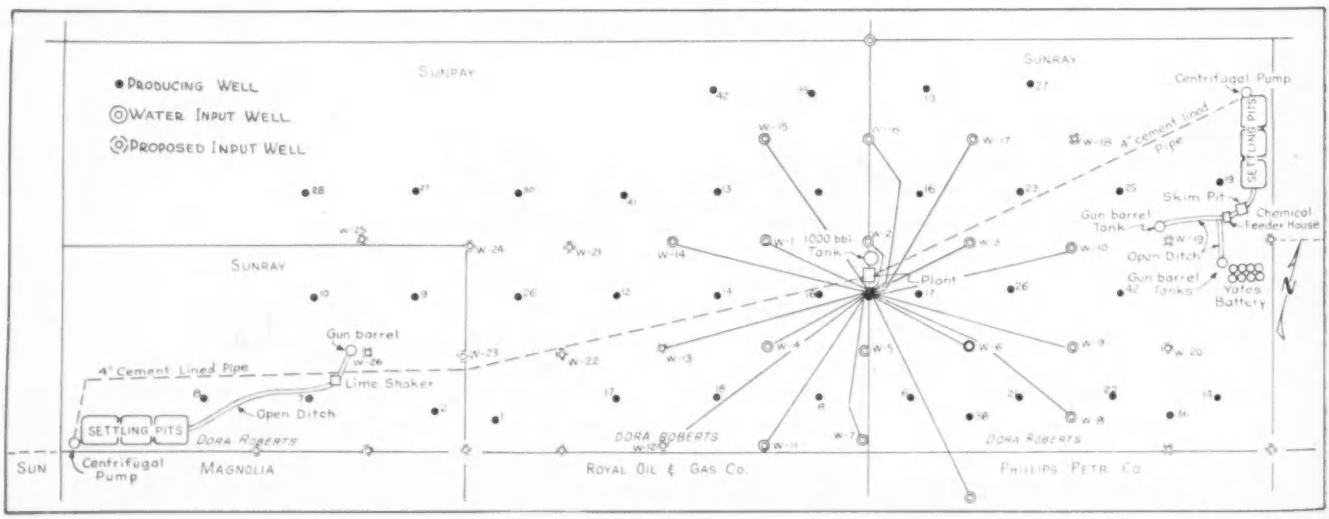
cement. The plug was drilled out with a tubing string using fresh water. The rig was moved off, the well bailed dry and a check made on oil and water production. If water influx was noted, a resinous filler was dumped on bottom.

Old producing wells were originally completed with 6⅝-inch and 7-inch outside diameter casing, and these were equipped with 2-inch tubing and hold-down tension packers.

Water injection into seven wells began on Feb. 10, 1952. One injection well was added in April and a second in October of that year. This last additional well effected two more producing wells, bringing the total producing wells from 14 in September to 16 in October. The pilot flood in October included nine injection wells. Production from the flood for the month of February totaled 6200 barrels. For October, total production was 23,405 barrels. Up to this time, cumulative water injected amounted to 606,559 barrels and cumulative oil production 101,472 barrels.

Initial injection rate was based on one barrels of water per acre-foot of effective net sand pay. Since spacing pattern was 10 acres, initial injection per well averaged 300 barrels per day. For the first 4½ months, injection wells took water on a vacuum. Some difficulty was experienced during the first five months of the pilot flood due to calcium carbonate deposition on the sand face of input wells. This condition was alleviated by injecting 250 gallons of 15 percent hydrochloric acid into the well at intervals of 1½ to 2 months. Time to acidize was determined by increases in injection pressures and corresponding decreases in volumes of water injected. Calcium carbonate deposition was attributed to differential pressures across the sand face during initial stages of the flood. During this time, the well took water rapidly while the formation voids were being filled. Production statistics for the first six months of the pilot flood show no appreciable increase in production during which time considerable quantities of water had been injected into the Yates sand.

Oil production for February, 1952, was 6200 barrels, and in June the Yates sand produced 7860 barrels of oil. During this period, 296,546 barrels of water had been injected into the formation. However, after June,




**WATER SUPPLY AND INJECTION SYSTEM** of the Dora Roberts water flood.

1952, production began to show the effects of the flood, and the following month, production increased almost 2000 barrels.

Since June, 1952, no trouble has been experienced in the injection wells due to deposits of calcium carbonate. Undoubtedly, the pressure differential across the sand face has been lowered to a point where it no longer effects the deposition of calcium carbonate.

**Flood Increased.** Success of the pilot warranted an increase in the acreage flooded, and in November, 1952, five more injection wells and 18 producing wells were added to the project, bringing the total injection wells to 14 and producing wells to 34. Acreage was increased from 85 under the pilot flood to 150 after the expansion. Since November, 1952, four more injection wells have been added, making a total of 18 injection wells. No new producing wells were added. As a result of the flood program to date, production increased from 6200 barrels in February, 1952, to 93,649 barrels during June, 1953. Cumulative oil production stood at 672,353 barrels and cumulative water injected totalled 1,844,070 barrels at the end of June, 1953.

**Source Water.** An adequate supply of injection water has been a problem since the project was expanded in November, 1952. The curve of monthly water injection rates indicates that for June, 1953, amount of water injected was 174,386 barrels compared to 186,581 barrels for the previous month. Oil production for these months responded accordingly.

**SETTLING PITS** in right background and skimming pit at left. Settling pits are converted evaporation pits.

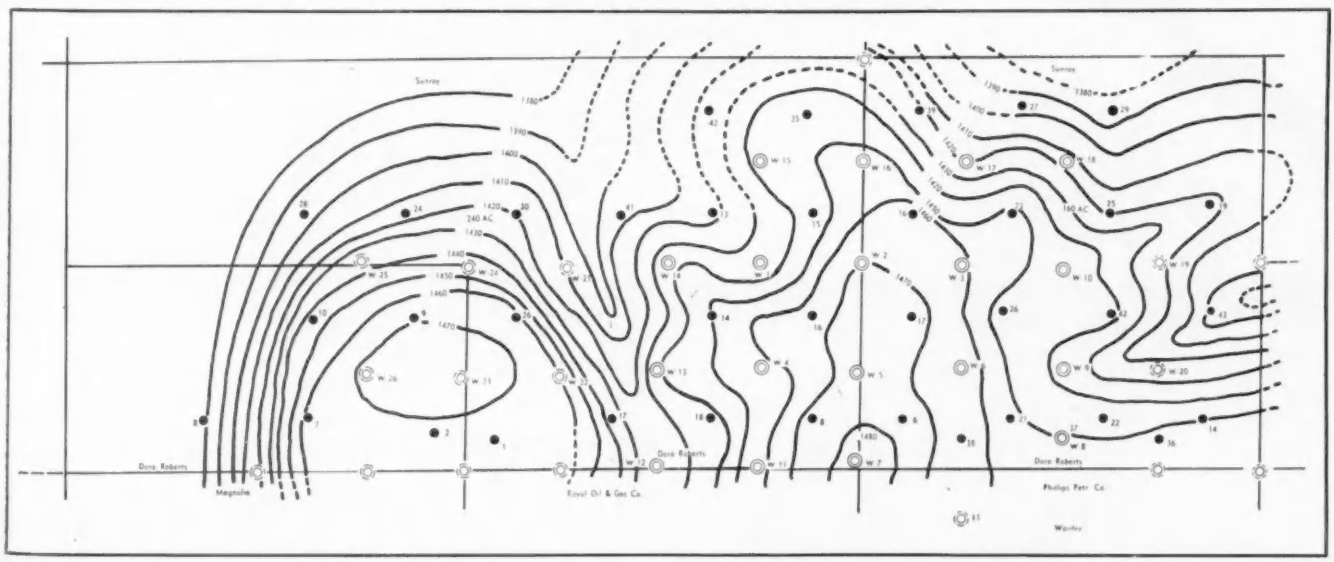
Production of oil in June, 1953, was 93,649 barrels compared to 101,724 barrels for the preceding month.

Water used is from lease gunbarrel tanks and consists of a mixture of produced water from all four zones underlying the Dora Roberts lease. About 95 percent of the injected water is from the Clearfork. A chemical analysis of the mixed water is shown in Table 3.

**Permeability Profiles.** Current injection rate is about 7100 barrels of water per day into 17 injection wells, averaging 418 barrels per day per well. Injection pressures vary from 50 to 600 pounds per square inch, depending upon the permeability characteristics and the number of feet of net sand exposed to the bore hole. In order to determine where the water is going in the Yates sand, permeability profiles were made on injection wells. Radioactive cobalt was disintegrated in a wire line tool suspended opposite the top of the Yates sand while water was being injected at a predetermined rate. A radioactive survey was made to determine where in the Yates zone the water was going. If most of the water was entering a relatively thin section, the well was acidized by dumping about 250 gallons of 15 percent hydrochloric acid into the well.

A second radioactive survey was made in the same manner as described above and at the same injection rate. The resulting curve indicates the relative distribution of water throughout the sand face interval.

**Treating Injection Water.** Salt water is gathered from gunbarrels




**CONTOUR MAP** made on top of Yates sand underlying the Dora Roberts lease.

Excerpt from field report:
"Some time ago we decided to install Axelson Duax liners and heavy chrome plated, pin-end, grooved plungers in a number of our extremely tough wells. We are now getting approximately 500 per cent longer pump runs."

*Chosen first.... to last* **AXELSON**

PETROLEUM PUMPING EQUIPMENT

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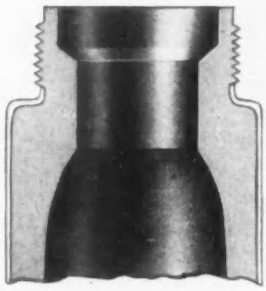
**AXELSON MANUFACTURING COMPANY • Division of Pressed Steel Car Company, Inc.** • PLANTS—Los Angeles 58, California; St. Louis 16, Missouri. • OFFICES—New York City 7, New York; Tulsa 1, Oklahoma; Buenos Aires, Argentina. • DISTRIBUTORS—Jones & Laughlin Steel Corp., Supply Division; Great Northern Tool & Supply Co.; Industrial Agencies Ltd., San Fernando, Trinidad, B. W. I.; Industrias Waldrip & Campbell, Barcelona, Caracas and Maracaibo, Venezuela; Sociedad Comercial de Materias Primas Limitado, Rio de Janeiro, Brazil; Wells Fargo & Co., Express, S.A., Apartado Postal 361, Mexico, D.F.; Dominion Oil Field Supply Co., Ltd., Calgary, Canada.

*paired* FOR *performance*

# AXELSON

**pin end, grooved plunger (chrome plated)**

Design permits maintenance of a uniform outside diameter of the plunger from end to end, thus providing good protection against the introduction of abrasive material between the plunger and liner walls. *Chrome plated* plungers (used in many installations where abrasion occurs to any degree) provide exceptional resistance to most corrosive conditions. The low coefficient of friction of chromium makes it ideal for use with all types of liners and regular and hardened steel barrels.



Chromium is plated to a greater thickness on groove shoulders and shoulders of pin-end.

# AXELSON

**dual-metal Duax liner**

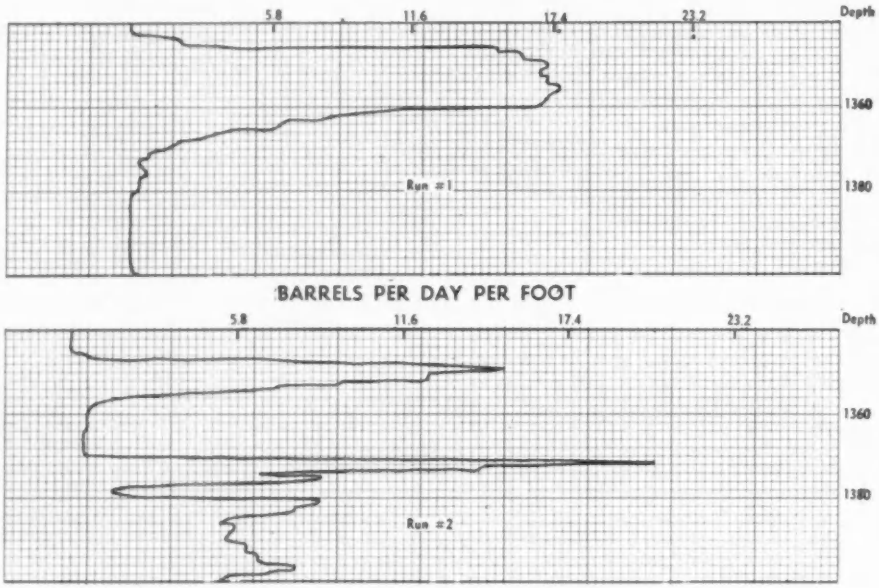
The Duax liner stands in a class by itself for sheer strength and resistance to corrosion. The black coating of the tough steel outer shell has lubricating properties which increase the resistance to corrosion and minimize galling of end-faces when liners are assembled. This remarkable iron-and-steel liner is unusually resistant to splitting, yet its alloyed iron wearing surface is hardened to a degree once thought impractical. The secret of its success lies in Axelson's method of:

(a) alloying the iron;

(b) spin-casting the iron into its steel shell to get perfect bonding;

(c) hardening and tempering the iron in electric furnaces.

*Write for Bulletin No. 5005*



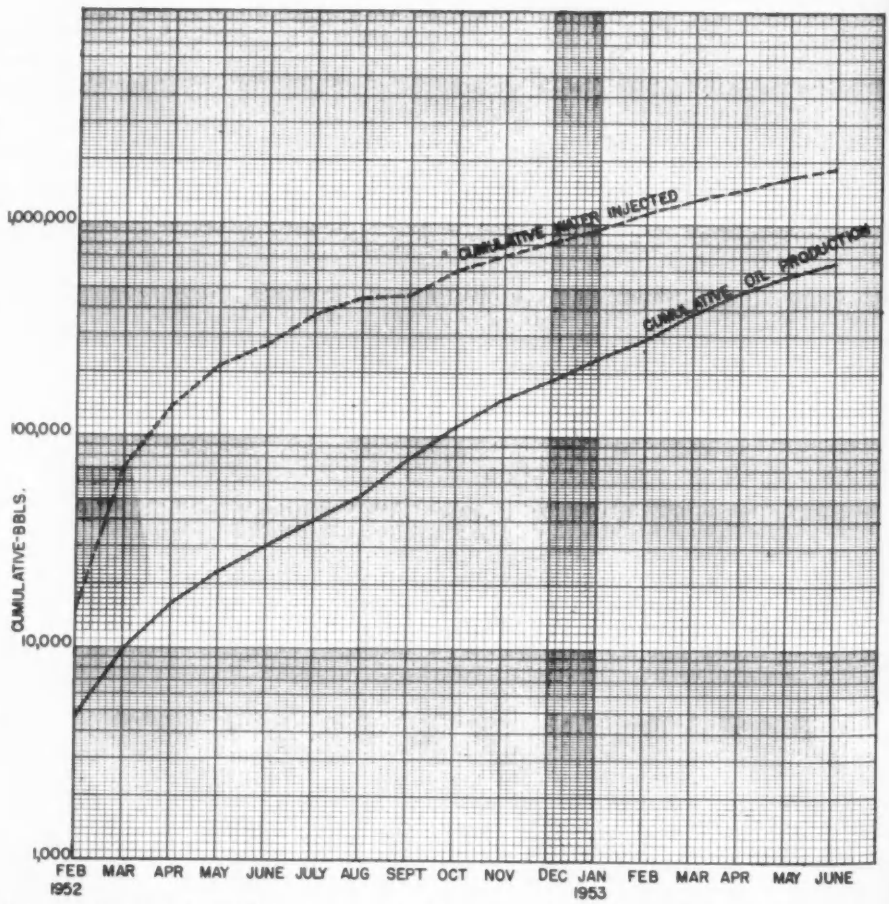

**TYPICAL PERMEABILITY PROFILES** made by radioactivity surveys during water injection before and after acidizing. Injection rate was constant during both surveys.

at the tank battery and flowed in open earthen ditches to skimming and settling pits. The skimming pit removes any traces of oil that might have been carried over through the gunbarrel. There are two installations of skimming and settling pits on the Dora Roberts lease. One is located at the eastern edge and the other at the southwest corner. These settling pits were converted evaporation pits formerly used to take the salt water produced on the lease. Bottoms of the pits were mudded off to prevent seepage into the ground. At each installation, there are three individual pits which allow about 48 hours of detention time for the water.

The mixed lease water contains some hydrogen sulphide which, for the most part, is released as the water flows down the open ditches to the skimming pits. The water contains considerable calcium carbonate which is removed by precipitation in the settling pits. Lime is added to the water as it flows in the open ditches. Small wooden structures are placed over the open ditch and automatic feeders add about 1½ pounds of hydrated lime per 100 barrels of water.

Calcium sulfate deposits have been a source of trouble in the producing wells. This problem was encountered when production from one well began to decline for no apparent reason. When the tee connection at the well head split open, it was lined with a heavy coating of calcium sulfate. The well was pulled, and the rods and tubing were found to be coated. The mud anchor was full of calcium sulfate deposits, as was the pump. Other wells were checked and six were found to be in a similar condition. A sequestering agent was added in the casing annulus of all producing wells to reduce the deposition of calcium sulfate in the well. To minimize this problem when the producing wells began to make injected water, the calcium ion concentration of the injected water was lowered by adding 35 pounds of soda ash per 100 barrels of water treated. Soda ash was added to the water as it flowed down the open ditches to the skimming pits. Effectiveness of both programs is yet to be evaluated because sufficient time has not elapsed since they were started.

Corrosion is not a serious problem. Small amounts of calcium carbonate have been deposited on the inside surface of tubing and metal equipment to serve as a protective coating against corrosion. However, an organic inhibitor is injected into water taken from the pits and pumped by means of a centrifugal pump to the filtering plant. About 1½ quarts are injected into the pump suction per 1000 barrels of injection water. Cement-lined pipe is used throughout the distribution and gathering lines so no corrosion problems have been




**CUMULATIVE CURVES** on oil production and volume of water injected into the Yates sand. To date, one barrel of oil has been produced for every 2.757 barrels of water injected.

*National*

# TANK ENGINEERS SOLVE CRUDE HEATING PROBLEMS IN LEDUC FIELD

SOUTH LEDUC—4' x 27½' "YCP" 15# National Treater

LEDUC—4 Hi-500 Bbl. National Bolted Steel Tanks

1 6' x 20' "YIWP" 15# National Treater

1 2C, 2½' x 13' 125# National Separator

1 NC, 2' x 6' 125# National Separator

Instead of expensive boiler installations, many Canadian operators are turning to National Treaters to maintain crude pour point under extreme weather conditions. Temperatures as low as 60° below zero, inadequate water supplies, frequent shut-downs, oil loss through steam heat evaporation were the difficulties that led National engineers to a practical and economical solution.

By re-designing piping hook-ups and circulation lines, by putting crude in at the bottom of the tanks and by installing a National Treater instead of a boiler, all difficulties of maintaining pour point have been eliminated. Crude is circulated from tanks through treaters. Unlike boilers, National Treaters require very little water.

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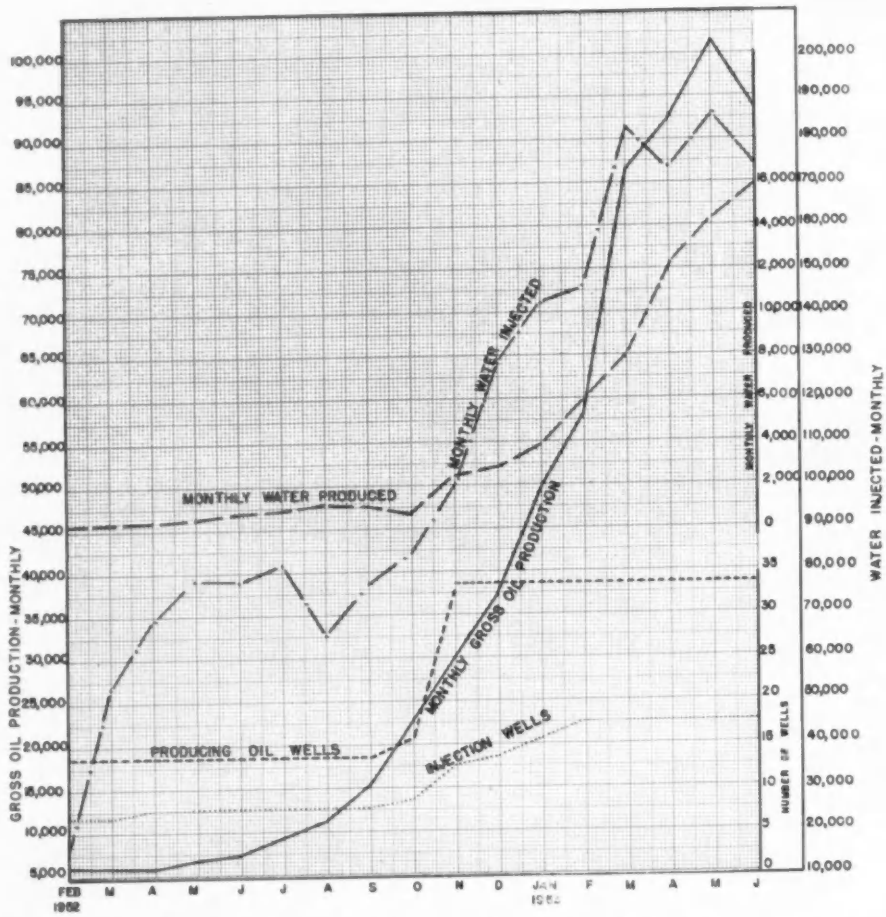
## NATIONAL TANK COMPANY

TULSA, OKLAHOMA

1-2-53


GROSS OIL PRODUCTION - MONTHLY
WATER INJECTED - MONTHLY
MONTHLY WATER PRODUCED
MONTHLY WATER INJECTED
MONTHLY GROSS OIL PRODUCTION
PRODUCING OIL WELLS
INJECTION WELLS
NUMBER OF WELLS
FEB 1952
M A M J J A S O N D JAN 1953 F M A M J

**PERFORMANCE CURVES** on the Yates sand in the Dora Roberts lease of Howard-Glasscock field of Howard County, Texas. The pilot flood was initiated on February 10, 1952.

encountered here. Only evidence of corrosion has been in line welds and in sharp bends where turbulence occurs. There has been no trace of bacteria to cause any problem thus far.

**Surface Operations.** Water from gunbarrel tanks taking oil from all producing zones on the lease flows in open ditches to a simple skimming pit where small amounts of oil are removed. Additional water for the enlarged flood is being supplied from offset leases to assure adequate water for efficient operation.

Soda ash and lime are added to the water as it flows in the ditches to the skimming pit. An open ditch carries the water from the skimming pit to the first of three large earthen settling pits. Troughs connecting one pit to another are staggered to minimize channeling of water through the pits. Detention time of the water from the time it enters the first pit until it is taken out of the last pit is about 48 hours.

An organic inhibitor is injected into the suction of a 3 x 4-inch centrifugal pump driven by a 25-horsepower electric motor. The pump is equipped with bronze head and impellers, and is rated at 500 gallons per minute at a head of 190 feet of water. Since there are two gathering pit installations on the lease, a centrifugal pump at each location is constantly pumping treated salt water to the filter plant.

**Filtration.** Treated water is pumped from both gathering pit installations through 4-inch cement-lined pipe to the filter and pump plant. Water enters the top of two 8 x 5-foot rapid sand filters. Differential pressure across the filter bed is about 5 pounds per square inch. When the differential across a filter reaches about 10 psi, it is back-washed by means of a small electrically-driven centrifugal pump. This pump takes filtered water from a 1000-barrel storage tank and pumps it into the bottom of the filter tank. Back-wash water is transferred into a 300-barrel tank which gradually drains back into the settling pits where water is re-treated. Filtered water from the filter tanks is stored in a 1000-barrel wooden tank near the filter and pump house.

**Pumps.** Water pressure for injection is provided by two electrically-driven triplex plunger pumps. Each pump is equipped with 4-inch porcelain-coated plungers, and has a capacity of 3500 barrels per day each. Electric motors are rated at 75 horsepower. Individual 6-inch suction lines feed each pump. To insure that all cylinders are flooded as equally as possible, dual 4-inch lines tie into the suction

**TABLE 1**

**Waterflood Performance Data**

Sunray's Dora Roberts Lease, Howard-Glasscock Field, Howard County, Texas

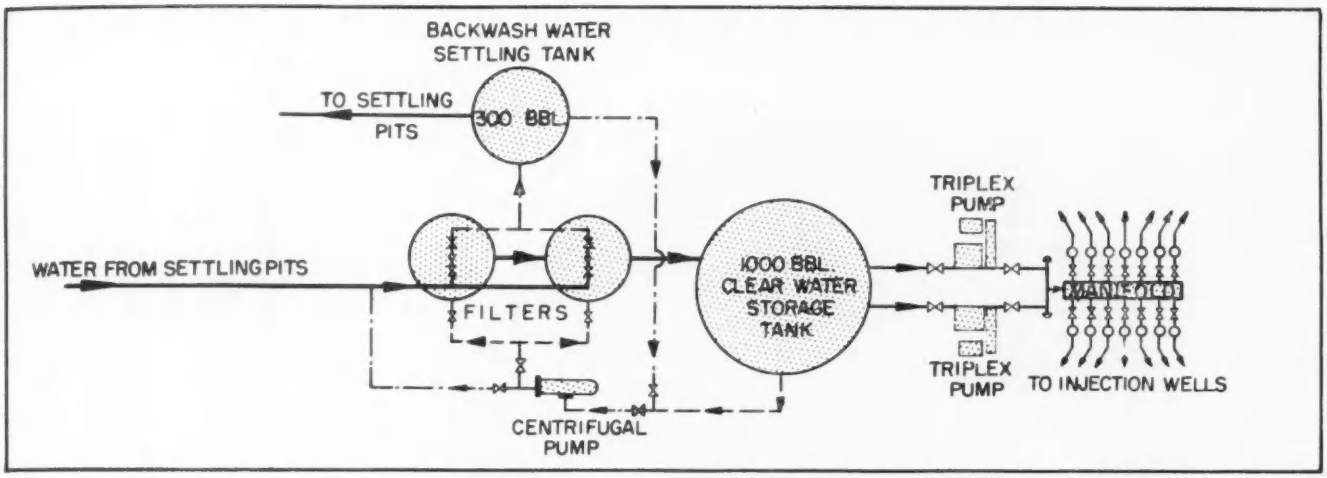
| DATE | NUMBER WELLS | | Gross Oil Production Bbls. | Water Produced Bbls. | Water Injected Bbls. | CUMULATIVE TOTALS —BBLS. | |
|---|---|---|---|---|---|---|---|
| | Injection | Producing | | | | Oil Production (Since start of Waterflood —2-10-52) | Water Injected |
| Feb. 1952 | 7 | 14 | 6,200 | 406 | 14,986 | 3,800 | 14,986 |
| Mar. 1952 | 7 | 14 | 6,293 | 434 | 54,120 | 10,093 | 69,106 |
| Apr. 1952 | 8 | 14 | 6,090 | 520 | 69,563 | 16,183 | 138,669 |
| May 1952 | 8 | 14 | 7,068 | 620 | 79,252 | 23,041 | 217,920 |
| June 1952 | 8 | 14 | 7,860 | 840 | 78,626 | 30,901 | 296,546 |
| July 1952 | 8 | 14 | 9,610 | 930 | 82,574 | 40,511 | 377,376 |
| Aug. 1952 | 8 | 14 | 11,656 | 1,240 | 66,368 | 52,167 | 443,744 |
| Sept. 1952 | 8 | 14 | 15,900 | 1,170 | 78,000 | 78,067 | 521,564 |
| Oct. 1952 | 9 | 16 | 23,405 | 961 | 84,995 | 101,472 | 606,559 |
| Nov. 1952 | 13 | 34 | 30,720 | 2,580 | 100,768 | 151,076 | 707,111 |
| Dec. 1952 | 14 | 34 | 37,665 | 2,976 | 129,422 | 188,741 | 836,533 |
| Jan. 1953 | 16 | 34 | 50,049 | 3,937 | 142,725 | 238,790 | 979,276 |
| Feb. 1953 | 18 | 34 | 58,856 | 6,356 | 146,110 | 297,646 | 1,125,764 |
| Mar. 1953 | 18 | 34 | 86,633 | 8,268 | 183,880 | 384,279 | 1,309,644 |
| Apr. 1953 | 18 | 34 | 92,701 | 12,390 | 173,868 | 476,980 | 1,483,512 |
| May 1953 | 18 | 34 | 101,724 | 14,356 | 186,581 | 578,704 | 1,670,093 |
| June 1953 | 18 | 34 | 93,649 | 15,892 | 174,387 | 672,353 | 1,844,070 |

**TABLE 2**

**Estimated Reservoir Saturation Conditions**

Dora Roberts Lease, Sunray Oil Corp., Howard-Glasscock Field, Howard County.

| | Bbls./ Acre Ft. | Percent of Pore Space |
|---|---|---|
| Total Pore Space (20%) | 1550 | 100.0 |
| Connate Water | 620 | 40.0 |
| Initial Reservoir Oil | 930 | 60.0 |
| Shrinkage (FVF) 1.1 | 85 | 5.5 |
| Initial Stock Tank Oil in Reservoir | 845 | 54.5 |
| Oil Saturation of Reservoir Before Waterflooding | 550 | 35.5 |
| Residual Oil Saturation After Waterflooding (18%) | 280 | 18.0 |
| Water Flood Recovery (100% eff.) | 270 | 17.4 |
| Water Flood Recovery (50% eff.) | 135 | 8.7 |




**SCHEMATIC FLOW DIAGRAM** through filter and pump plant of Dora Roberts water flood in the Howard-Glasscock field, Howard County, Texas.

of each pump from the 6-inch feeder.

Both pumps discharge into a common 4-inch header at about 600 psi. To prevent damage to the pumps should the discharge line pressure build up beyond safe working pressures, a by-pass line connects the discharge of each pump with the suction feeder. A pressure relief valve in this by-pass opens should the discharge pressure reach 1000 psi.

**Injection System.** The injection manifold is located just outside the pump house. Individual 2-inch lines to each injection well connect into this manifold. One-inch connections tie into the manifold in order to reduce cost of valves and meters. Each tie-in contains a globe valve, a strainer, a positive displacement water meter, a 1-inch metering valve and a pressure gauge. The line then swedges up to 2 inches for connecting into the cement-lined distribution pipe.

The metering valve permits accurate adjustments for injection pressures on each input well. Since the permeability of each well varies, and it is desired to inject equal volumes of water in each well, injection pressure from one input well to another will vary widely. By injecting equal volumes into each well, the flood pattern can be controlled.

At the input well, the injection line is swedged down to a 1-inch horizontal run containing a globe valve, an insulated union and a check valve. The well head assembly is a simple one, consisting of a tee, a 2-inch master valve, and 2 x 4½-inch swedge which connects to the casing.

**Controls and Safeguards.** The 1000-barrel filtered water storage tank is equipped with an electrode system that controls the starting and stopping of both centrifugal pumps at the settling pits. Another electrode in the filtered water tank shuts down the entire plant should the water in the tank drop below the 4-foot level. Both pumps are safeguarded by mercury switches that stop the pump should the injection pressure drop too low or go too high. A third mercury switch on each pump can stop the pump should the lubricating oil pressure drop below safe values. A 24-hour chart meter records pressures in the injection manifold.

**OPEN DITCHES** such as this one carry water from gunbarrel tanks to skimming pits.

**Latest Expansion.** In July, 1953, the water-flood was in the process of further expansion to include a total of 290 acres, incorporating 26 injection wells and 36 producing wells. Two additional filter tanks will be added to the plant to handle adequately additional injection water needed. Approximately 3000 barrels of mixed gunbarrel water will be supplied from offset leases to meet the need of the enlarged program. It is estimated that an additional million barrels of oil will be recovered from the Dora Roberts lease as a result of the water-flood program. —**The End**

**TABLE 3**

**Chemical Analysis**

**Water Sample from North End of Settling Pond (Mixed water from all zones), Dora Roberts Lease, Sunray Oil Corp., Howard-Glasscock Field, Howard County.**

| | Parts per Million | Percent |
|---|---|---|
| Sodium and Potassium | 27,907 | 33.74 |
| Silica | 24 | 0.03 |
| Iron | 36 | 0.04 |
| Calcium | 2,682 | 3.25 |
| Magnesium | 894 | 1.08 |
| Chlorides | 28,527 | 58.68 |
| Bicarbonates | 143 | 0.17 |
| Sulphates | 2,489 | 3.01 |
| Total Solids | 82,702 | 100.00 |

$_{p}H = 6.9$ Sp. Gr. = 1.0581
Water contains suspended matter.

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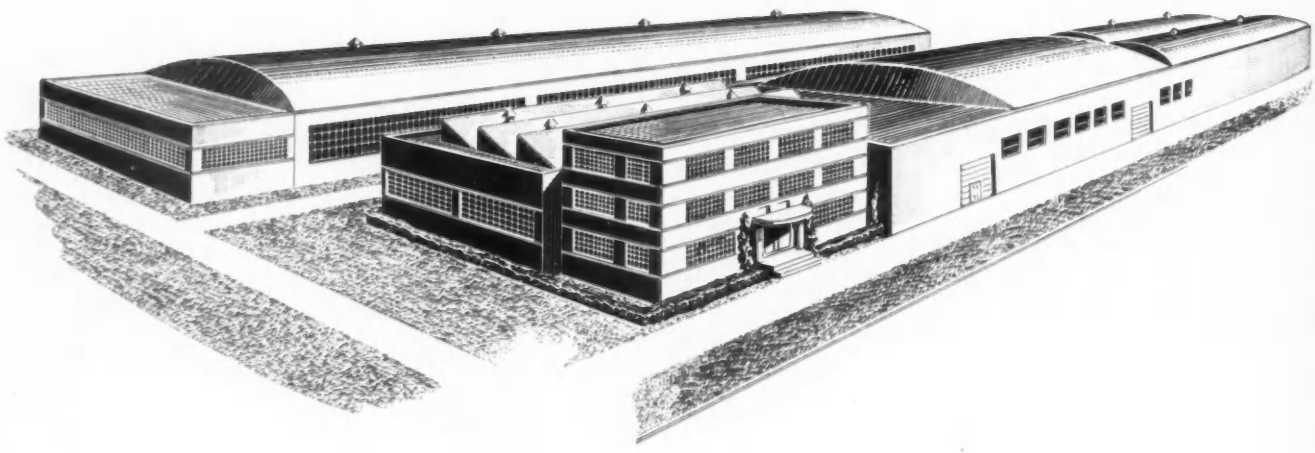

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**PUMP TRUCKS LINE UP** near North Cowden well before starting treating operation with sand-laden acid gel. Black tank in background contains lease oil used to flush the acid gel into the formation.

# Well Stimulation at North Cowden Pays

**Stanolind uses sand-laden acid gel to fracture the Grayburg pay. This new technique is simple and production increases have been high.**

**By J. E. KASTROP,** WORLD OIL Staff

WHEN STRAIGHT acid treatments failed to bring about material increases in production from wells in the North Cowden field of West Texas, Stanolind Oil and Gas Company used a sand-laden acid gel to treat the Grayburg producing formation. Fourteen wells have been worked over since the program was started in April, 1953. Average cost per job was about $5200.

Production increases have been as much as 19 times that of former daily rates. After 13 wells had been treated, total allowable for these wells was increased 8440 barrels per month over previous production schedules, based on 20 producing days per 31-day month.

The North Cowden field lies in Andrews and Ector counties, and wells discussed are located on Stanolind leases in Ector County in North Cowden Unit Blocks 10, 19, 29, 32, 33, and 35.

**The Grayburg Pay.** Principal producing formation is the Grayburg limestone of Permian age. Producing interval in the North Cowden field exists at an average depth of about 4300 feet, with approximately 200 feet of gross pay section and 250 feet of open hole. The Grayburg is composed of sandy lime and dolomitic and anhydritic limestone beds with occasional thin layers of shale and silty sand. Sands grade both vertically and laterally into sandy dolomite or lime, with the degree of porosity varying widely. Range of porosity is from 0.5 to 20 percent. Permeability is uniformly low. Range is from less than 0.005 to an isolated determination of 72 milidarcys. General range is from less than 0.05 to 20 milidarcys. Weighted average permeability of the longer cored sections range from 0.8 to 1.5 milidarcys. Bottom-hole temperatures are in the neighborhood of 80° F.

**Treating with acid gel.** Treating wells with a sand-laden acid gel is an outgrowth of developments in formation fracturing. Material used is a creamy, smooth semi-liquid of acid, kerosine, emulsifying agents, inhibitors and an Ottawa sand. Viscosity of the acid material is such that it holds the small sand grains in suspension. Stanolind wells were treated with 3000 gallons of jellied acid containing two pounds of Ottawa sand per gallon. The sand is of smooth, rounded grains, varying in size from 20 to 60 mesh, averaging about 30 mesh. Some treatments in North Cowden have been made with as little as one-half

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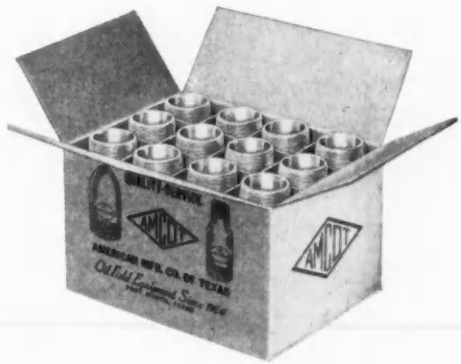


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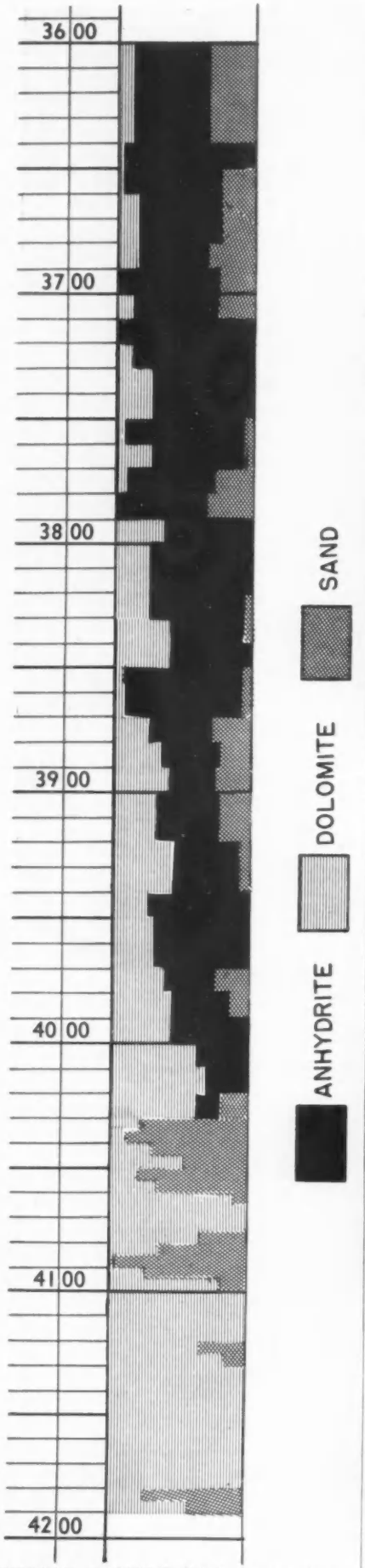



**TYPICAL SAMPLE LOG** of Grayburg pay in North Cowden field.

**TYPICAL WELLHEAD HOOKUP** for gel acid treatment. Two lines connect to header and tubing, while third line ties into the casing annulus for holding back pressure on top of packer. Normally, 2½-inch lines are used.

**THESE TWO GAUGES** (right foreground) provide accurate measurement observation of injection and casing pressures. Left gauge measures back pressure on annulus; right gauge determines injection pressure. Liquid level in tanks is gauged periodically during treatment.

pound of sand per gallon of acid gel.

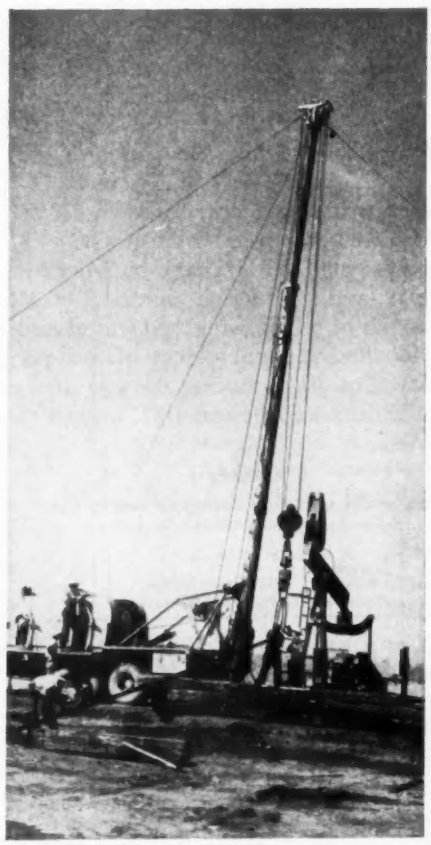
The gel is made up in the following proportions: 850 to 880 gallons of 15 percent hydrochloric acid inhibited with sodium arsenite to control corrosion, combined with 120 to 150 gallons of kerosine to which is added about 40 pounds of a gum resin emulsifying agent. Resulting viscosity of the gel is about 20,000 to 25,000 centipoise. The acid base constituent acts upon calcareous material such as limestone, dolomite, and upon petroleum residues and silicates in the formation. The sand serves as a scouring agent and props fractures.

The creamy mixture is pumped into the formation at high rates under high pressures to open up existing fractures and create additional fractures—vertical or horizontal—and to force as much of the suspended sand into these openings as possible. The emulsion does not break down until the acid reacts with the formation, and then it becomes thin, leaving the sand in place, and permitting the residue liquids to be produced from the well.

**Treating procedures.** The required amount of sand laden acid gel is mixed at a central storage plant and loaded into tank trucks. Motor transports have a capacity of 2000 gallons and trailers are equipped with tanks that can handle 1000 gallons. The acid gel mixture is churned constantly by reverse rotating augers 16 inches in diameter mounted on shafts extending the length of the tanks. These augers are powered by separate engines or by a universal shaft takeoff from the conventional truck winch drive unit. Pump trucks are equipped with two triplex pumps powered by the truck engine. These trucks also have tanks of 2000-gallon capacity.

The 14 wells treated since April, 1953, up to this writing, were initially completed in 1939, 1940 and 1941. All wells were originally shot with from 200 to 800 quarts of nitroglycerin and one well had been heavily acidized. Before wells are re-treated with the sand-laden acid gel, bottoms are checked with wire line for possible fillup. Should a well contain cavings that cover what appears to be good permeable sections in the bottom of the hole, it is cleaned out prior to treatment. Such wells are cleaned out by reversing circulation of lease oil. Cost of such cleanout jobs is about

**CONSISTENCY** of sand-laden acid gel is demonstrated by pouring the substance from tin cup. Viscosity breaks down after reaction with formation.



**AFTER TREATING** well, 2½-inch special tubing is pulled and regular 2-inch tubing run back in well.

$2200. Since most wells are equipped with two-inch tubing, this string is pulled and 2½-inch N-80 tubing equipped with tool joints run in for treating operations. Purpose of the larger string is to reduce friction losses in the pipe when pumping the viscous gel at high rates, and to provide greater strength for use of high pressures.

Paraffin has accumulated in the casing of some wells. In order to eliminate any trouble when running a packer in the well on the 2½-inch string preparatory to treating, hot oil is pumped into the casing and produced through the original tubing to melt out the paraffin deposits. This process provides a clean casing wall. Prior to treating with acid gel, all 14 wells were pumpers and were equipped with 2-inch tubing.

The workover job on North Cowden Unit Block 19, Well 2 is somewhat typical of stimulation procedures. Total depth is 4190 feet, and bottom of 5½-inch casing at 3947 feet, to expose 243 feet of open hole. Rods and tubing were pulled and the special string of 2½-inch N-80 tubing equipped with tool joints run back in the well. Tubing was run open ended and set about 30 feet off bottom. In some cases, the last 15 feet of the bottom joint were also perforated so the gel would flow out unrestricted. A hookwall packer was run in on the tubing and set at 3693 feet. A hydraulic hold down tool was placed immediately above the hookwall packer to provide extra anchorage on top of the packer.

If the well is not loaded with oil during the paraffin job or cleanout operation, lease oil is pumped in and circulated through ports in the tubing above the hydraulic hold down tool. The surface hookup was tested to 6000 pounds per square inch to make certain that no connections leaked. Three pump trucks are normally used. Discharge from one pump is connected to the casing annulus so that about 500 pounds pressure can be held on top of the hydraulic hold down tool when injecting the acid gel. Packer seat is tested with 500-600 pounds pressure on the annulus. The other two pump trucks are tied into the tubing by separate lines that connect into a header at the well.

Oil in the tubing string (about 22 barrels) plus oil in the surface lines is pumped into the formation followed

by the sand-laden acid gel. Rate of injection varies from 5 to 7 barrels per minute and injection pressures may reach 3500 psi. Average injection pressure for the 14 wells is about 2500 pounds.

After 3000 gallons have been injected, lease oil is pumped in at these same high rates to flush the acid into the formation and displace certain of the sand grains back into the fractures. Amount of oil flush used varies from 170 barrels to 269 barrels.

When all the flush oil has been pumped into the well, pressure is bled off the surface lines and equipment is disconnected. Rod and tubing crew unseat the packer and hold down tool and pull the 2½-inch N-80 tubing. Well studies and previous experience will indicate what may be expected in the way of bottom-hole pressures. However, in most cases the column of lease oil in the well normally keeps the well killed during the tubing job. If there is a possibility that the well will flow, a packer is run in on regular upset 2-inch tubing. However, a pump seating nipple is run in the string regardless of what may be expected. A packer will prevent gas from separating at the bottom of the well, and this energy is utilized in aiding the well to flow naturally.

With the tubing landed and the well head in place, the well is swabbed to clean out the flush oil and the acid residue. Since the time required to pull the 2½-inch N-80 tubing, run in the 2-inch tubing and nipple up is about 4 to 5 hours, the injected acid has sufficient time to react on the formation.

After the packer on the 2-inch tubing has been set, the well is given every opportunity to flow in order to clean out any sand that may have accumulated in the hole. However, if it does not flow, the well is swabbed until the acid residue has been removed and clean formation oil is obtained. Rods and pump are then run in the well and the pumping unit started to put the well back on production.

**Results.** Production increases gained by these treatments have been satisfactory in every case to date. Out of the 14 wells treated, all of which were former pumping wells, five came in flowing after treating. Table I summarizes pertinent data on each of these 14 workover jobs. Most remarkable increase was noted in North Cowden Unit Block 35, Well 3, which prior to stimulation pumped only nine barrels of oil per day. After treating, it pumped 211 barrels of oil, no water daily. These results may be compared to gains made by straight acidizing. Well 12, Unit Block 32, was treated with 10,000 gallons of 15 percent straight acid in three stages. Prior to acidizing in June, 1951, the well pumped two barrels of oil per day; after treatment, it pumped only eight barrels daily.

**Wells Treated Earlier.** Evidence that production increases have sustained may be found in several wells treated with acid gel in the early part of 1952. One well located south of the Stanolind leases flowed 53.6 barrels of oil, a trace of water and 148 thousand cubic feet of gas on a 24-hour production test in April, 1952. The well was treated with 3000 gallons of acid gel and sand on May 14, 1952, and production increased to 88 barrels of oil (flowing) no water, and 316 thousand cubic feet of gas per day. For 20 producing days in June, 1953, the well flowed 1600 barrels of oil and 90 barrels of water, making an average daily rate of 80 barrels of oil and 4.5 barrels of water.

Another well treated earlier was pumping 30 barrels of oil and no water daily prior to stimulation on June 16, 1952. After treatment, the well pumped 118 barrels of oil and less than one barrel of water daily. In June, 1953, the well averaged 66 barrels of oil and seven barrels of water per day.

A third well pumped only 633 barrels of oil during the month of March, 1952. It was treated with 3000 gallons of sand-laden acid gel on April 19, 1952, and came in flowing. Production for the following month totalled 1800 barrels. During the month of June, 1953, the well flowed 1060 barrels of oil and 30 barrels of water.

Although production in these earlier wells has dropped slightly, it is evident that material gains can be expected to hold up for several years. Average gain in production per well for the 13 wells treated was about 650 barrels per month, and average cost of stimulation treatment was approximately $5200. Average payout for the workover at this rate of increase is only 3.2 months.

**Influencing Factor.** The North Cowden field was unitized and in the summer of 1951, a gas injection program was begun. This is a pressure maintenance project with controlled pressure decline. Only about 50 percent of the produced gas is now being injected back into the formation, and the bottom-hole pressure is expected to decline. Due to the retarded pressure decline as a result of the gas injection program, the producing rates obtained after the workovers should be sustained for a longer period of time. **—The End.**

**TABLE I**

**Workover Data Sheet—Stanolind Oil and Gas Company North Cowden Field, Ector County, Texas**

| WELL NAME | Date Completed | Initial Treatment Qts. Nitro | Initial Potential BOPD | Production Prior to Workover | Repotential After Acid Gel and Sd. Treatment | Date Treated | Interval Treated (Open Hole) | Size of Treatment (Gallons) | INJECTION PRESSURE Max. | INJECTION PRESSURE Min. | Average Injection Rate—BPM | Volume Flush Oil Bbls. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. North Cowden Unit Block 19, Well No. 5 | 11-19-39 | 512 | F 650 | P 11 BOPD | P 90 BOPD— 5 BWPD | 4-21-53 | 4120-4525 | 3000 | 3300 | 2100 | 5.9 | 180 |
| 2. NCUB 35, Well No. 16 | 4-10-40 | 380 | F 1255 | P 39 BOPD | F 83 BOPD— 2 BWPD | 4-24-53 | 3955-4200 | 3000 | 3500 | 1200 | 5.0 | 180 |
| 3. NCUB 29, Well No. 5 | 6- 8-39 | 425 | F 1976 | P 26 BOPD | P 201 BOPD— 4 BWPD | 5-13-53 | 4081-4382 | 3000 | 3500 | 3300 | 6.5 | 215 |
| 4. NCUB 32, Well No. 15 | 8- 1-40 | 300 | F 1323 | P 17 BOPD | F 185 BOPD— 2 BWPD | 5-25-53 | 3942-4200 | 3000 | 3200 | 2000 | 6.0 | 235 |
| 5. NCUB 19, Well No. 3 | 10-14-39 | 440 | F 861 | P 12 BOPD | F 152 BOPD— 27 BWPD | 5-26-53 | 4155-4480 | 3000 | 2700 | 2300 | 7.0 | 170 |
| 6. NCUB 10, Well No. 16 | 11- 7-41 | 810 | P 329 | P 11 BOPD | P 100 BOPD— 5 BWPD | 5-27-53 | 4304-4857 | 3000 | 2650 | 2500 | 7.2 | 225 |
| 7. NCUB 33, Well No. 4 | 9-16-53 | 680 | F 1297 | P 13 BOPD | P 82 BOPD— 65 BWPD | 6- 2-53 | 4025-4440 | 3000 | 1800 | 1800 | 6.0 | 177 |
| 8. NCUB 32, Well No. 8 | 6-26-40 | 300 | F 907 | P 6 BOPD | P 115 BOPD— 1 BWPD | 6-15-53 | 3972-4210 | 3000 | 3100 | 2700 | 6.0 | 269 |
| 9. NCUB 35, Well No. 3 | 8-23-40 | 285 | F 1197 | P 9 BOPD | F 211 BOPD—No water | 6-24-53 | 3940-4200 | 3000 | 2000 | 2000 | 4.5 | 221 |
| 10. NCUB 35, Well No. 1 | 6-29-40 | 280 | F 1252 | P 25 BOPD | P 66 BOPD— 64 BWPD | 7- 7-53 | 3960-4215 | 3000 | 1900 | 1900 | 6.0 | 240 |
| 11. NCUB 35, Well No. 8 | 2-24-40 | 215 | F 1511 | P 16 BOPD | F 218 BOPD— 3 BWPD | 7-10-53 | 3944-4190 | 3000 | 2350 | 2200 | 6.5 | 215 |
| 12. *NCUB 32, Well No. 12 | 7- 7-40 | 310 | F 850 | P 4 BOPD | P 73 BOPD— 62 BWPD | 7-20-53 | 3950-4210 | 4000 | 3300 | 3000 | .... | 212 |
| 13. NCUB 29, Well No. 4 | 1- 4-39 | 220 | F 720 | P 14 BOPD | P 111 BOPD—146 BWPD | 7-27-53 | 4072-4350 | 3000 | 3000 | 3000 | .... | 260 |
| 14. NCUB 19, Well No. 2 | 8-30-39 | 600 | F 713 | P 16 BOPD | ..... | 7-29-53 | 4125-4525 | 3000 | 2900 | 2900 | 5.5 | 230 |

* This well treated 6-4-51 with 10,000 gals. 15% HCL—3 stages—Before—P 2 BOPD—After P 8 BOPD.

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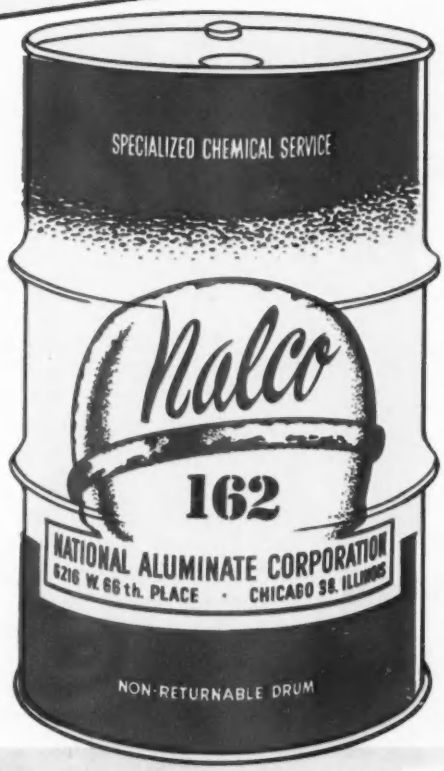


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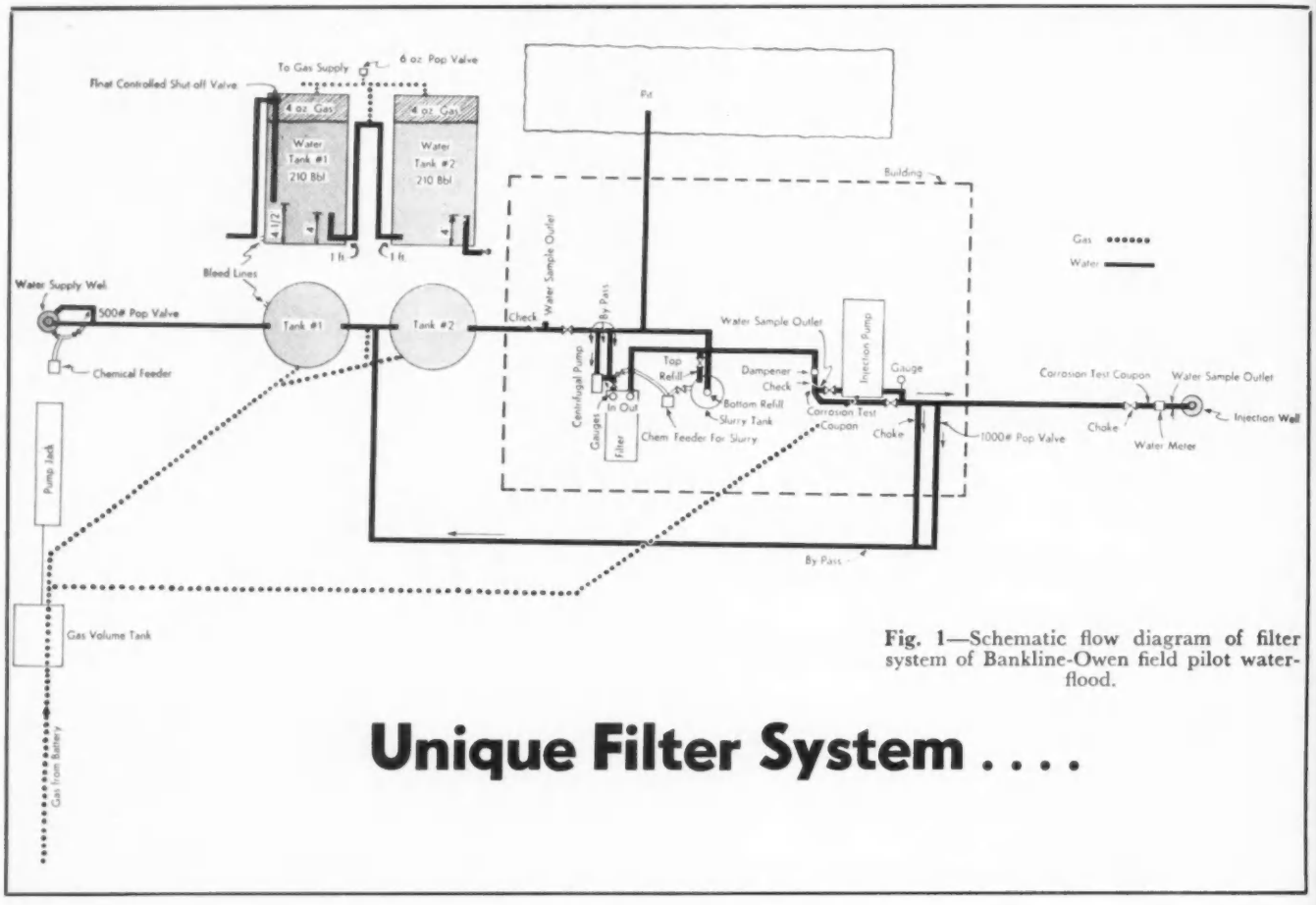


**Fig. 1**—Schematic flow diagram of filter system of Bankline-Owen field pilot waterflood.

# Unique Filter System . . . .

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**First of its type in West Texas, this system is flexible, efficient and uses a diatomaceous earth filter.**

**By R. O. (JACK) MAJOR,** Bankline Oil Company, Cisco, Texas

TESTING THE FEASIBILITY of waterflooding the Bankline-Owen field of Eastland County, Texas, has pointed to the need for a high-quality injection water for the pilot flood. Outcome of studies was a filtration system of unique design that featured a filter which uses asbestos-type filter sheets and diatomaceous earth mixed with unfiltered water. Initial requirement of the pilot plant was only 500 barrels of filtered water daily at a maximum pressure of 900 pounds per square inch. The pilot test was begun by Bankline Oil Company more than 18 months ago to determine results of flooding the Lake Sand reservoir.

Low structural relief on top of the producing sand discouraged any attempt toward the formation of a gas cap by gas injection. Bottom-hole pressure and production decline pointed to a recovery of less than 15 percent of the original oil in place by primary means. It became imperative that a program be started at the earliest possible date to determine the best method of secondary recovery. Rapid increase in gas-oil ratios and pressure decline led to an early conclusion that the primary recovery mechanism was solution gas drive. Production records indicated that the benefit from a water drive was negligible.

**Fig. 2**—Water supply well equipped with chemical injector which adds a bactericide to the casing annulus which is opened at bottom. Chemical may be injected directly into flow line.

Since the first well was drilled in May, 1950, Bankline has completed 23 field wells and J. J. Lynn Oil Company has completed two wells. Upon full development of the field, bound-

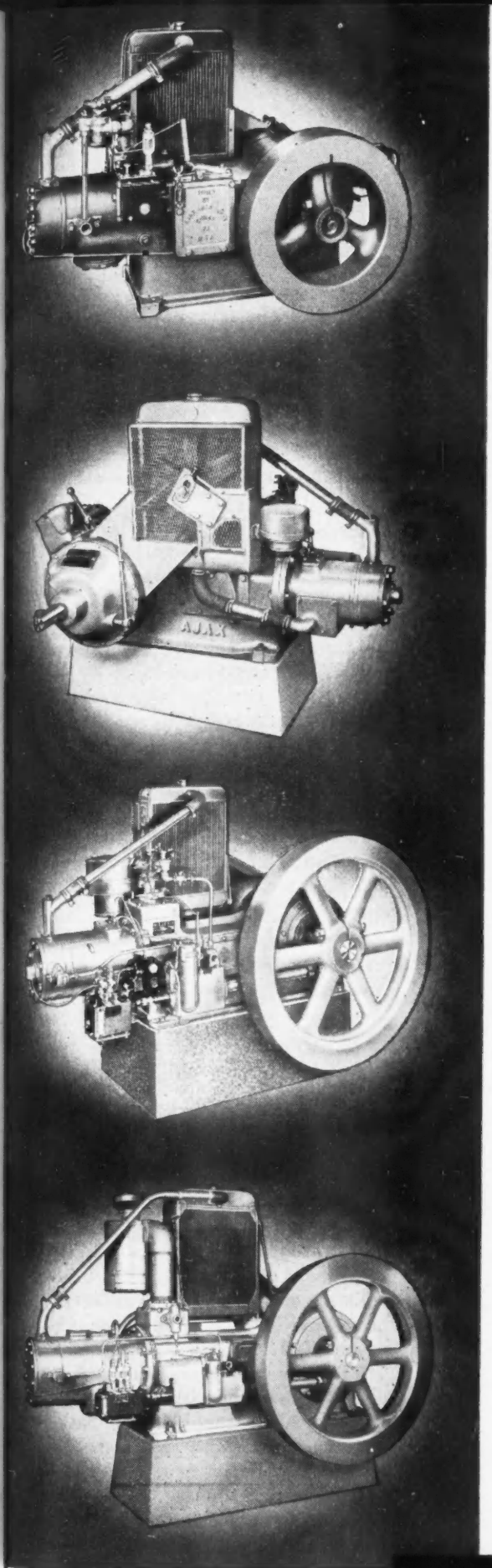

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Fig. 3—Plant site of pilot flood. Water supply at left, plant at right, adjacent to two 210-barrel water settling and storage tanks.

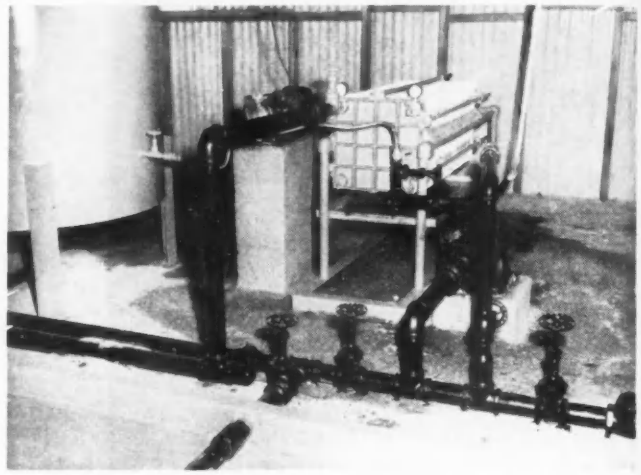


Fig. 4—Filter unit which handles 500 barrels of injection water per day. Diatomaceous earth is mixed with water in tank at left. When storage tanks are full, centrifugal pump by-passes filter and water flows back into suction.

aries of the water table were established, and the aerial extent of the field was found to be extremely limited in size.

**The Reservoir.** The Lake Sand reservoir is a sand or conglomerate member of the Smithwick formation of Pennsylvanian age. It occurs in the vicinity of Lake Eastland, Eastland, Texas, at a depth of 3200 to 3300 feet. The Lake Sand member is composed primarily of clear quartz crystals and of crystal fragments that are weathered to extremely fine particles. Crystals and crystal fragments, when distinguishable as such, are imbedded in a fine, clay-like, rusty brown bentonitic matrix. Interspersed throughout the Lake Sand are glauconite particles.

A single field well may penetrate as many as 3 or 4 separate lenses of Lake Sand, and frequently 2 or more lenses appear to be joined as a single body. Individual lenses of the Lake Sand member vary in thickness from a fraction of an inch to 25 or 30 feet; usually the thicker lense representing the joining of several smaller lenses. Within a single Lake Sand lens, lamina of alternating sand or silt and shale often constitute the entire thickness. Some vertical fractures have been observed in cores, and crossbedding is a common feature of deposition.

**Reservoir Data.** Of the 23 field wells operated by the Bankline Oil Company that were completed as producers, 10 were cored. Irregular permeability distribution is shown by the following table of results obtained from 78 sample analyses from five representative wells.

| Thickness, Percent* | Permeability (Md.) |
|---|---|
| 5 | 102 |
| 20 | 30 |
| 40 | 11 |
| 60 | 3.5 |
| 80 | 0.4 |
| 100 | 0 |

*Cumulative thickness as percent of total.

Other reservoir data which will give an indication of the nature of the Lake Sand are:

**Average Porosity** ..... 16.21%
**Conate Water Saturation (percent of porosity)** ..... 31.37%
**Average Sand Thickness** ..... 17.75 feet
**Average Residual Oil Saturation (percent of porosity)** ..... 24.50%

In addition to the existing problem of irregular permeability was the unknown effect that might result from artificial fracturing of the formation. All wells required fracturing for initial completion.

**Water Supply.** A prolific water-bearing sand of the Strawn series of Pennsylvanian age is present throughout the Bankline-Owen field area at a depth of approximately 1650 to 1770 feet. Presence of this abundant water supply contributed to the decision to initiate a pilot water-flood program.

Analyses were made of water produced from the Lake Sand and from the Strawn Sand to determine the type of treatment necessary to insure proper water quality. Results of these analyses showed the following, on a parts-per-million basis:

| Ions Present | Lake Sand Water | Strawn Sand Water |
|---|---|---|
| Na | 42,800 | 19,950 |
| Ca | 11,160 | 2,854 |
| Mg | 1,730 | 576 |
| Ba | 0 | 53 |
| Fe | 46 | 9 |
| Cl | 90,700 | 37,440 |
| $SO_4$ | 237 | 1 |
| $HCO_3$ | 0 | 0 |
| pH | 5.3 | — |

In order to obtain the desired quality of water at a minimum cost, the following recommendations were followed:

- Operate a completely closed system.
- Install a good quality filter.
- Inject a suitable bactericide in injection water stream.
- Make periodic tests of injection water quality.

A plant capable of delivering 500 barrels of injection water daily at a maximum pressure of 900 pounds was considered sufficient for the pilot program. A diagram of this plant is shown in Figure 1.

Water is supplied by a well drilled with a 9-inch bit through three separate sand lenses that are present between 1665 and 1769 feet. A 5½ x 7⅜-inch prepack gravel liner was run on 5½-inch casing with openings from 1659 to 1769 feet. Bridging baskets were set at 1627 and 1637 feet. Two-and-one-half-inch tubing was run to 1617 feet with 10 feet of 2½-inch home-made gas anchor. A salt water service pump with 2-inch x 12-foot working barrel and 2-inch plunger was installed in the well. Under optimum conditions, the well was capable

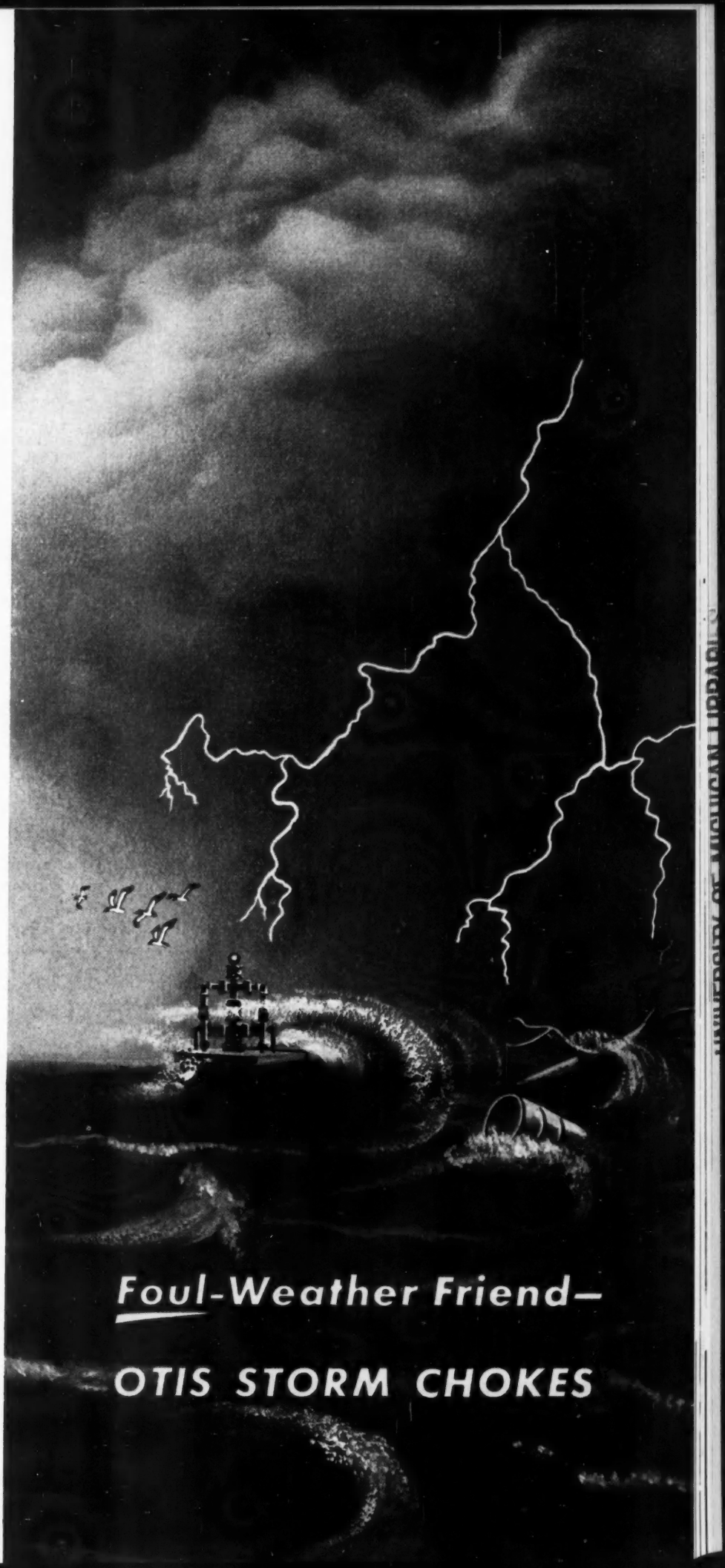
of delivering approximately 550 barrels of water daily.

**Water Treatment.** Injection of a bactericide into the annulus of the source well is accomplished by means of a small pump powered by the movement of the beam on the water well unit. Chemical volume is regulated by adjustable stroke length of the small pump. Small changes in the water well pump speed cause only negligible change in the chemical injection volume. Provision is made for the injection of the chemical into the water line, if desired, rather than into the annulus of the water-well. Figure 2 shows the piping arrangement of the system for injection of the bactericide at the water supply well.

Water settling and storage takes place in two 210-barrel tanks (Figure 3). At the end of the water line and leading to the first tank from the source well, is a float valve to cut off water entering the tank when a level above the water leg is reached. This causes the line pressure from the water well to build up, and at 500 pounds pressure, the pop valve at the water well is opened and water is bypassed into the annulus of the water well. After the water level in the first tank reaches the height of the water leg, water passes to the second tank for storage. Partial settling is accomplished in both tanks. A four-ounce gas seal is provided for each tank and in the water leg. This constant pressure is maintained by use of regulators in the gas line. A 1½-horsepower centrifugal pump delivers water from the storage tank into the filter. In order to maintain a constant volume of 500 barrels per day of water for the centrifugal pump, regardless of the system's requirement, and adjustable by-pass around the centrifugal pump is provided as shown in Figure 4.

**Filtration.** Filtration is accomplished by a diatomaceous earth filter shown in Figure 4. The filter is composed of a series of brass frames separated by asbestos sheets. Water enters alternate frames through ports, passes through the asbestos sheets into alternate frames and is collected in a discharge line. Solid material in the water is collected on the filter sheets along with diatomaceous earth which is added as a slurry to the intake line of the filter.

A filter cake composed of the earth



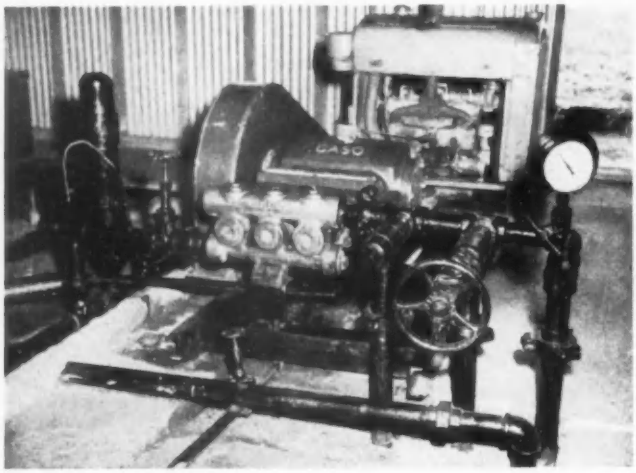


Fig. 5—Triplex pump equipped with bronze pistons and head pumps water to injection system at about 700 pounds pressure. Bypass on pump discharge flows water back to storage when pressure exceeds 1000 psi. Choke on a return line to storage tank permits accurate regulation of injection pressure.

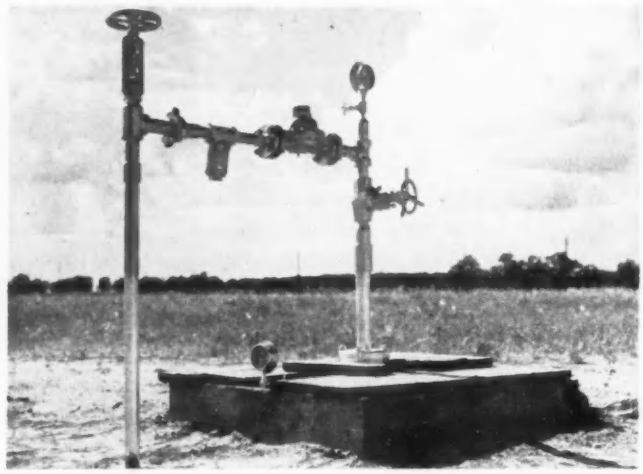


Fig. 6—Typical injection well equipped with choke to regulate required volumes of water, strainer, and direct-reading water meter.

and solid material present in the water is formed on the filter sheets. Diatomaceous earth keeps the filtered material dispersed so that a tight film of solid matter will not seal off the filter sheets. Quantity of earth necessary to get maximum life from the filter sheets is determined by trial and error. An inspection of the filter cake will reveal the proper adjustments necessary to prolong the life of the sheets.

Slurry is mixed as needed in a 500 gallon tank and is added to the filter by means of a chemical feeder. A single mixture consists of 50 pounds of earth for each 500 gallons of water. An agitator is used to keep the earth in suspension in the tank. Since the tank is open on top, a chelating compound is used to prevent the oxidation of the ferrous iron in the water. Provision is made to refill the slurry tank from the bottom so that new mixtures may be made in the tank without exposing untreated water to the air. Pressure drop across the filter is limited to not more than 25 psi.

Gauges on the "in" and "out" lines of the filter indicate the buildup in differential across the filter. Experience has shown that aproximately 10,000 barrels can be filtered through each set of filter sheets. To change filter sheets, six screw clamps are released with a ratchet wrench, the brass plates are separated, used sheets are removed and replaced with new ones. With some practice, two men can change the sheets in about 1½ hours.

**Pump System.** Water leaving the filter is delivered to a triplex pump that is equipped with bronze pistons and head (Figure 5). This pump is capable of delivering 1000 barrels daily at a pressure of 900 pounds. An air cushion is added in the line ahead of the pump to absorb some of the shock of the pump action. A by-pass is provided around the injection pump so that water may be delivered at a low pressure (25 pounds or less) to the injection wells in order to accomplish initial fill-up. Water leaving the injection pump is proportioned between the input well line and a line with a choke that returns to the water storage tank. This arrangement allows a constant pump speed when water volume requirement may vary. Any excess of water is returned to the storage for refiltration. Included on the discharge side of the pump is a by-pass controlled by a 1000-pound pressure valve that leads to the storage tank. In event the line pressure exceeds 1000 psi, the valve opens and water is returned to storage without bursting flow lines.

RUFUS ORVILLE (JACK) MAJOR is a field engineer for Bankline Oil Company at Cisco, Texas, in charge of development and reservoir engineering studies of the Bankline-Owen field of Eastland County. After graduation from Beaumont High School, he joined the U. S. Army Signal Corps, serving three years during World War II. When discharged, he entered the University of Texas where he obtained B.A. and M.S. degrees in geology, minoring in engineering. Upon completion of his studies at Texas, he was employed in February, 1950, by the Texas Railroad Commission as a service engineer at Abilene, Texas, where he worked for 10 months before joining Bankline.

**Water Sampling.** Collection of samples for testing water quality is made at water sample outlets which are located in the system before filtration, before entering the injection pump, and at the injection well. Two tests are made periodically to insure that the system is being maintained closed. The first test consists of measuring the ferrous iron from filtered samples collected at the three points. Any reduction in the ferrous iron content will indicate that partial exposure to air has taken place. The second test is a modification of the Cerrini (filtration test). Both tests have consistently shown that the water quality is good.

**Injection Wells.** The injection well was originally completed as a producing well. A 5½-inch casing was cemented through the pay zone, and the producing zone was opened by casing perforations. When the well was selected for injection, a circulating type packer was run on 2-inch tubing and set above casing perforations. Injection is through the tubing. Water is metered at the well-head of each injection well by direct-reading water meters, and chokes are provided at each well to regulate the required volume of water. —**The End.**

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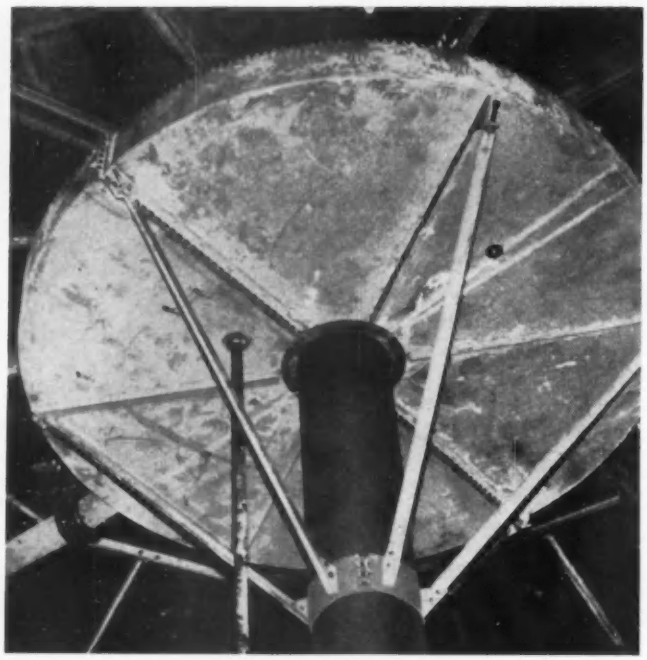

Fig. 9—Collecting tray.

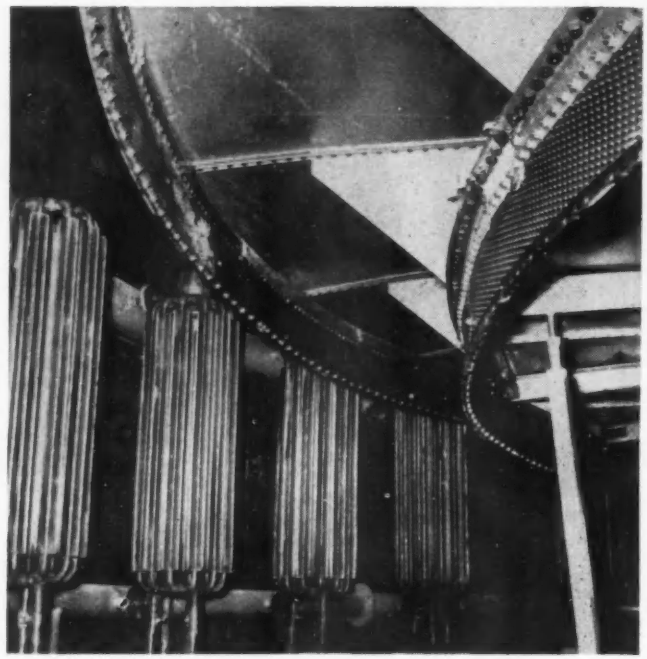

Fig. 10—Tank fintube heaters.

**Following pilot testing, a full-scale 10,500-barrel unit incorporates a . . .**

# New Wash Tank Design

**By ARTHUR R. WILLIAMS,** Shell Oil Company, Ventura, Calif.

**Full-Scale Dehydration Plant—Plant Design.** Geometry of the wash tank was partially determined by conditions external to the results of the pilot tests. It was concluded from the tests that the additional tank height above the oil-water interface was of no particular value in the dehydration process. It was desirable to use gravity flow from the wash tank into the 24-foot Taylor lease tanks. Cost of preparing a foundation to elevate the wash tank for gravity flow exceeded the cost of a taller tank. The wash tank was constructed as a 30-foot high by 50-foot diameter welded steel tank for a capacity of 10,500 barrels. A larger tank was not used because of difficulty in effectively spreading fluid over an area greater than 50-foot diameter.

Another factor in this decision was the flexibility provided during tank cleaning operations if more than one wash tank is used. The tank was situated on a foundation consisting of steel piling capped by a reinforced concrete mat which, in turn, was covered with approximately ten inches of gravel.

Sampling facilities for this tank include the conventional hatches plus seven sample cocks in the wall of the tank, three adjustable samples similar to those used in the pilot plant and shown on Figure 3, and a sample connection in the clean oil outlet line.

The fluid inlet line was connected to the dirty oil collecting lines and an orifice fitting was installed in the line near the base of the wash tank

**Part 2**

to regulate the flow. There are periodic fluctuations in the flow rate of this gravity system which are difficult to control under normal conditions. This problem was solved by using a back-pressure regulator to control the flow into the suction surge tank for the pumps of the existing electrical dehydration plant. By taking any large flow rates into this surge tank, the upstream pressure on the orifice remains constant. Since the static downstream pressure on the orifice is equal to the head of fluid to the gas boot on the top of the wash tank, the flow can be regulated and recorded. A dial-type flow indicator was used in determining the orifice size for the desired throughput rate and a record of this rate is obtained by the use of a differential pressure recording meter.

After the fluid leaves the orifice it passes through a four-foot diameter by

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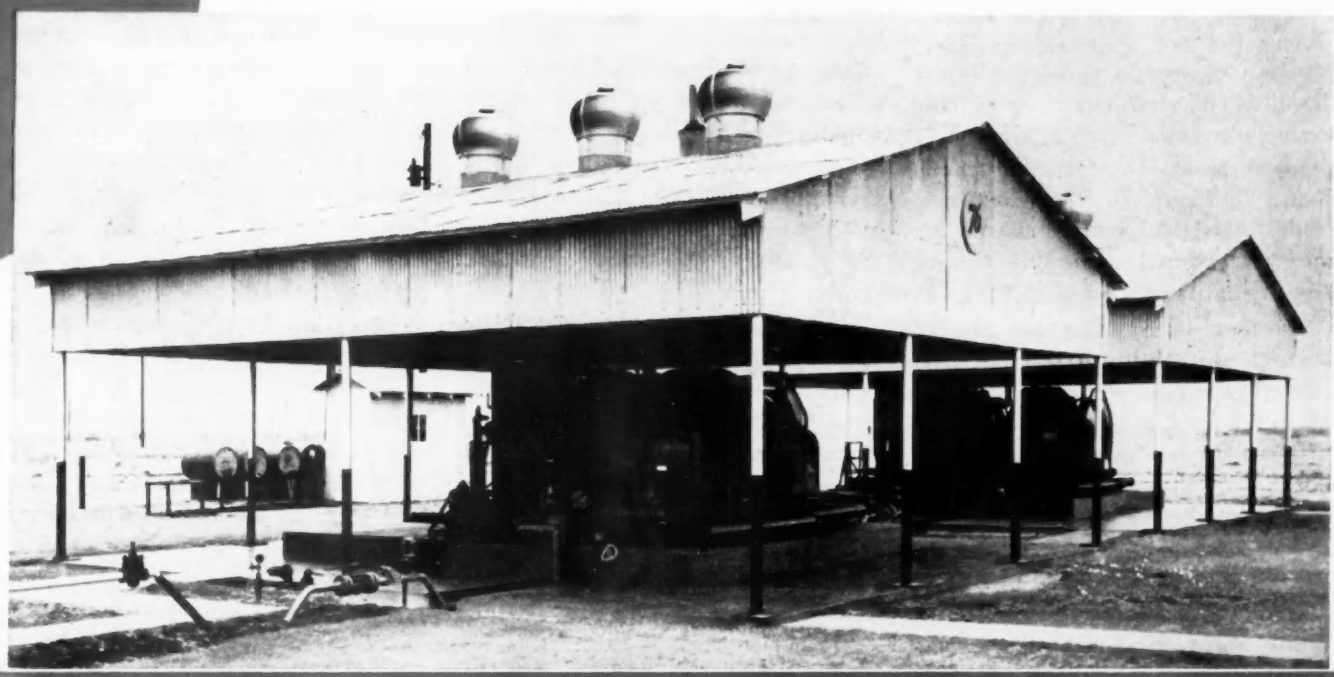

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six-foot, baffled gas boot or separator located on the top of the wash tank. The gas is transferred from the top of this separator and vented into the tank for collection in the vapor recovery system. The oil drains from the bottom of the separator into a 24-inch center column. The center column is supported from the bottom of the tank, but is open 18 inches off bottom.

The fluid then passes through a spreader which is an adaption of the pan-type spreader tested in the pilot plant. In this spreader, the fluid passes through louvers in a circular skirt designed with a diameter to bisect the area of the tank. The fluid then moves up under a "doughnut cutter" shaped spreading tray which again bisects the flow so that the emulsion is then divided into two equal areas. This method could be carried further if the area of the tank warranted, but with the loss in usable height with the increase in the number of stages, the two stages were considered most desirable for the 50-foot diameter tank used in this installation.

Each of these trays has a gas vent line which carries any trapped gas to the top of the tank rather than letting it boil up through the fluid in the tank. The details of the design of this spreader are shown in Figure 11. There was a slight deviation from the optimum area division to facilitate manufacture and installation.

After the fluid leaves this spreader, it passes through a water bath and the oil is collected in a clean oil collecting tray from which it is piped to the lease tanks. The collecting tray is shown in Figure 9. Waste water is bled through an internal water leg into an external adjustable control box located near the top of the tank.

Selection of a utilitarian type of heating equipment created a particularly difficult problem. Efficiency of direct-fired heaters is normally higher than hot water or steam-type heating and the use of heat exchangers is generally desirable. Use of heat exchangers in this plant would require the use of pumps on each oil stream. Variations in flow rates within the limits of practical control and the variations in cut, which, in turn, create output rate changes, presented an expensive pumping problem. The recovery of heat available in the waste water would require the pumping of the hot salt water and the concomitant maintenance problems.

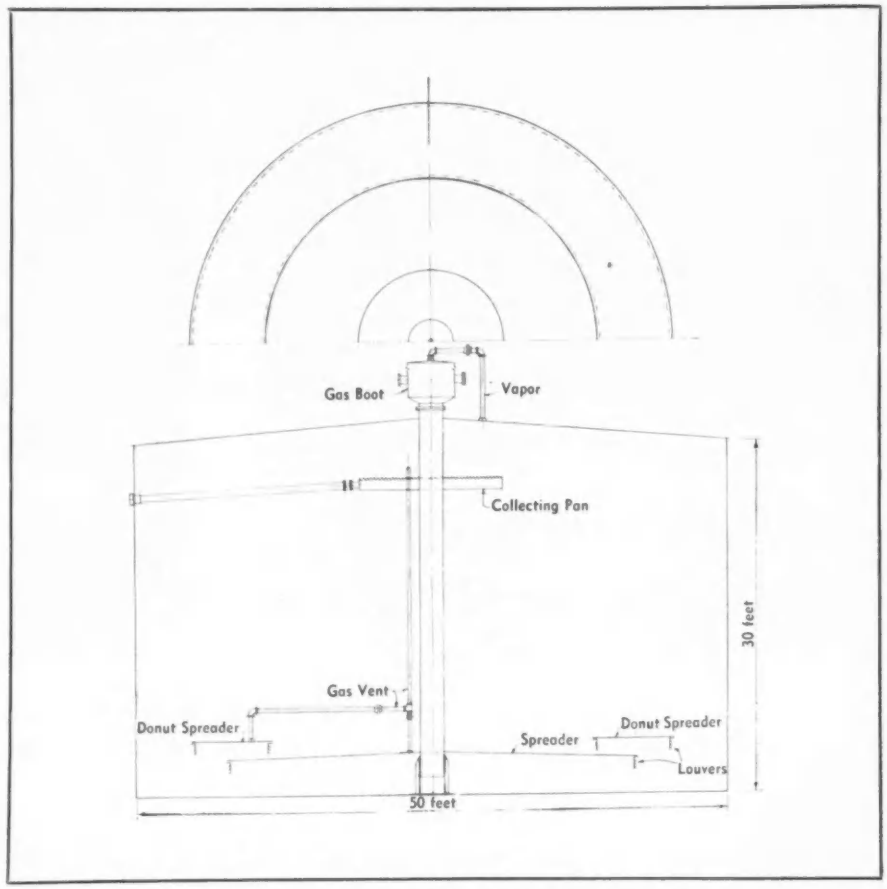


**Fig. 11**—Spreader and collecting tray for wash tank.

Unit heating in the tank without the use of heat exchangers was selected for this installation after an evaluation of the use of direct-fired heaters and heat exchangers or direct-fired heaters without heat exchangers. The latter system would have required pumps on the input stream only. The method selected has the additional advantage of the greater dependability of the gravity system.

A comparison of hot water or steam heating quickly showed that a hot water system is not applicable for a heating load of the magnitude anticipated in this plant. An automatic 400-horsepower, low-pressure, packaged boiler was installed. Boiler size was selected to approximate one-third of the full plant load with a plan to eventually have three units in the heating plant for greater flexibility during servicing or repair periods.

Steam is conducted through a 20-inch line to the tank and, after passing through a throttling-type control valve, it enters an eight-inch diameter circular distribution header. Connected to this header are 32 bundles of fin tubes, as shown in Figure 10. The bundles are 48 inches high by 18 inches in diameter and are equally spaced around the tank on the circumference of a 45-foot diameter circle. Each bundle of tubes has 265 square feet of heating surface. Condensate is drained from the bottom of these tube bundles through a collecting header into steam traps installed at ground level on the outside of the tank.

The traps force condensate into a feedwater tank at the boiler setting from which the boiler feedwater pump can take suction. Tank temperature is controlled through a thermo-actuated pilot valve mounted on the side of the tank which, in turn, controls the throttling valve in the steam line to the tank.

The boiler is equipped with automatic pressure controls which modulate the firing rate to satisfy the pressure load. This method of control was selected in preference to a direct control from the tank to the boiler since additional boilers and tanks are plan-

ned for this single steam transmission system.

Walls of the tank are insulated with a board-type insulation to reduce heat loss. The steam line was wrapped with sheets of glass wool to a thickness of approximately six inches. Thickness of insulation of the steam line was justifiable for the period of operation prior to the installation of the second and third boilers for which the line size was designed.

Chemical for this plant is added at the junction where the dirty oil stream is split between the wash tank and the electrical dehydration plant. It is recognized that results may be improved in the future if the chemical is added nearer the source of the production, allowing mixing through the gravity flowlines of the dirty oil collecting system. The change has not been made because it would necessitate the treating of the entire stream and the portion of the stream treated by the electrical dehydration plant does not require as much chemical as that portion treated by the wash tank.

Although the problem of corrosion has not been a major factor in wash tanks in the Ventura Field, the wash tank was protected by the use of 13 carbon anodes suspended through gauge hatches from the deck of the tank. A current is induced through the anodes to the wall of the tank. This method has proven effective in arresting electrolytic corrosion of tanks in fields where corrosion has been a severe problem.

**Results of Tests.** Tests were conducted on the first full-size wash tank to determine the throughput capacity of this tank before finalizing the design for the remainder of the plant. A testing program was planned for increasing the throughput rates while controlling the temperature of the oil in the tank at approximately 140° F., and the chemical addition rates at approximately two pints per 100 barrels of gross throughput. Samples of the output oil were withdrawn at each increase in throughput rate and tested for cut. Adjustments were made in the heat and chemical addition to control the cut of the output stream at less than 1 percent water.

At a wet oil throughput of approximately 17,000 barrels per day, the chemical rates was reduced while the temperature remained at approximately 140° F. A maximum wet oil

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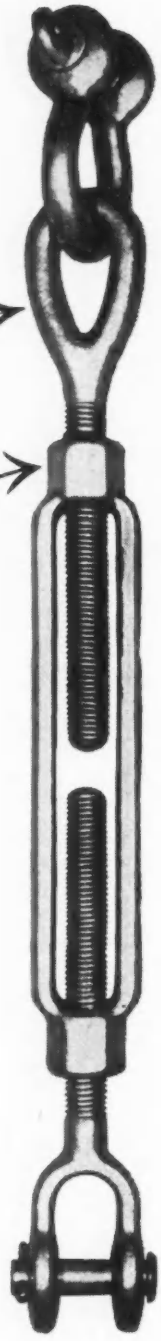

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throughput of 19,000 barrels per day was obtained with a wash water temperature of 140° F. and 1.6 pints of chemical per 100 barrels for an output cut of 0.9 percent at which time the operating cost was 70 percent of the former dehydration cost. The throughput could not be increased beyond 19,600 barrels per day because of the limiting heating capacity of a single boiler.

A water level of approximately 15 feet from the bottom of the tank had been established as the optimum for these conditions. In addition to the automatic waste water bleed from the water leg, the tank was equipped with four bottom drain connections for manual bleed of sediment. An investigation of the deposition of solids in the bottom of the wash tank revealed no measurable accumulation from the first 1,000,000 barrels treated.

A comparison of the results of the full-scale plant tests with the results of the pilot plant tests reveal that the throughput rates of the main plant exceed capacities that could have been anticipated from the rates treated in the pilot plant. This may be explained by the condition that the oil tested in the main plant is a composite of the entire Taylor lease stream, while the oil tested in the pilot plant was composed of only that portion of the stream being produced from the more recently-developed zones.

The increase in production will come from new development; therefore, the pilot plant results should represent the anticipated minimum future performance of the plant providing that there is no increase in the treating difficulty of the production.

History of the older zones indicates that any change in the production will probably result in a simplification of the treating problem as the zonal pressures decline. Another factor that may explain the disproportionately greater throughput rates with the full-scale wash tank is the additional height and the increased depth of the wash water.

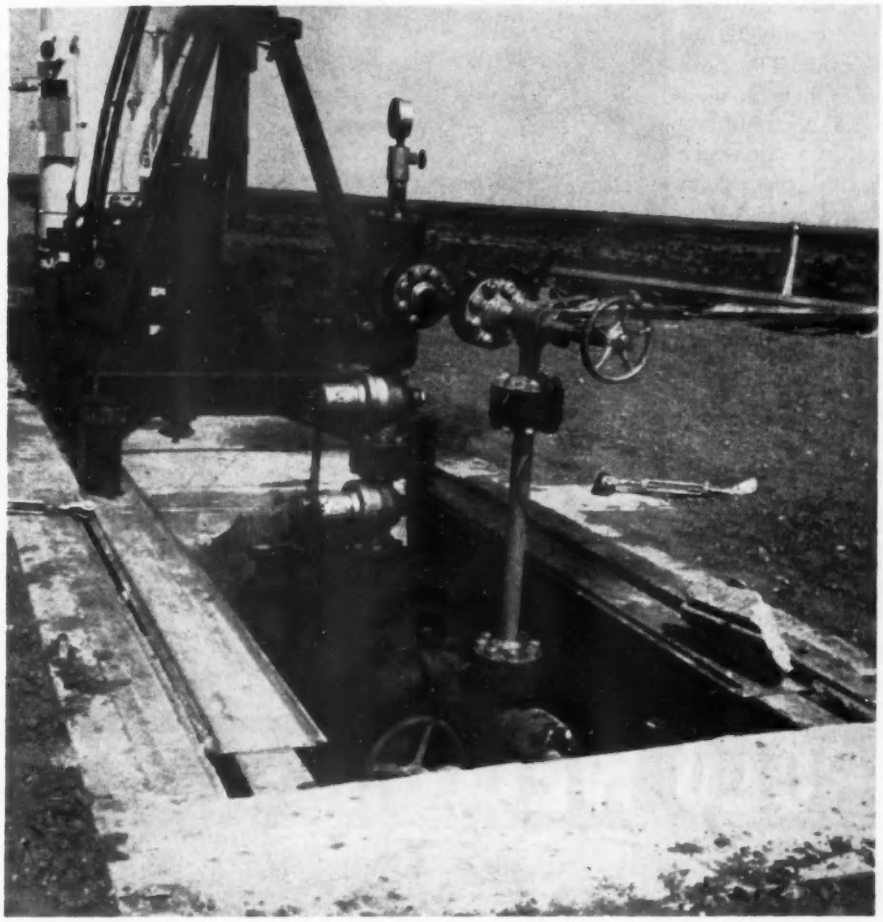
An attempt was made to derive an emperical formula for the height-to-volume relationship in wash tank operation. The effect of heat and chemical addition so overshadows the effect of the geometry of the tank that no useful formula could be derived.

—The End.

# How to do it

# PRODUCTION HINTS

***$10 is paid for each illustrated acceptable contribution. Mail to The Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas***



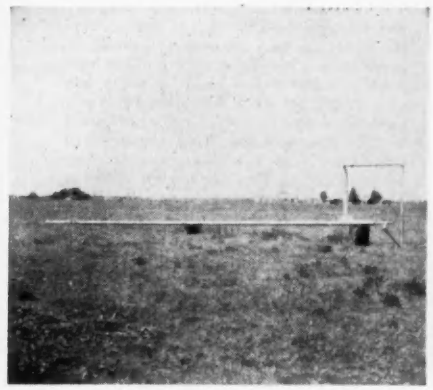
## Mounting Hydraulic Pumping Unit

Mount long-stroke hydraulic pumping unit on tracks so it may be skidded to one side when servicing the well. If a well is to be equipped with a hydraulic pumping unit, provisions can be made during early stages of completion to facilitate moving and setting up the unit later on. This well was intentionally placed in a cellar of concrete so that a prefabricated hydraulic unit could be placed over the well without elevating the foundation.

The concrete foundation around the well was extended to one side so the unit could be moved out of the way when servicing the well with a pulling unit. Heavy eight-inch channel iron was grouted in concrete on either side of the cellar to form tracks for the heavy hydraulic unit. When equipped with rods, the well head assembly will be shortened somewhat to fit just below the hydraulic cylinder of the pumping unit. The skid base of the unit was reinforced so that it would withstand skidding back and forth. Once in service, the hydraulic cylinder is properly guyed with four guy wires which can be disconnected quickly when it became necessary to move the pumping unit. A winch truck can easily pull the hydraulic pumping unit to one side after all connections have been broken. A well setting such as this saves time and trouble to the service crews when working on wells equipped with hydraulic units.

## Scrubbing Fuel Gas

Clean field fuel gas with a shop-made scrubber when oil is apt to carry over from separators or when gas is "wet." This simple means of scrubbing fuel gas is a long inclining pipe with a vertical extension at one



end, all of which are fabricated from scrap pipe. By reversing the flow of gas, entrained liquids and foreign matter are directed to the lower part of the knockout, where sufficient capacity is provided to allow for these to accumulate without carry over.

Two joints of junked 5½-inch casing are screwed together with a coupling at the field site. A bleeder valve is welded to the lower end of the double joint of pipe to drain the scrubber of entrained material. The other end is orange-peeled and welded to a piece of two-inch pipe which extends about eight feet inside the larger pipe. Outlet is a riser of 5½-inch casing with sturdy braces welded across the juncture to prevent failure under high pressure. The riser is swedged down to two-inch pipe which ties into a regulator to reduce line pressure down to the fuel system pressure.

By directing the inlet down past the riser into the outlet line, direction of the gas is reversed and all entrained liquids are trapped in the lower part of the scrubber. Large wooden blocks support the scrubber at a slight inclined angle.

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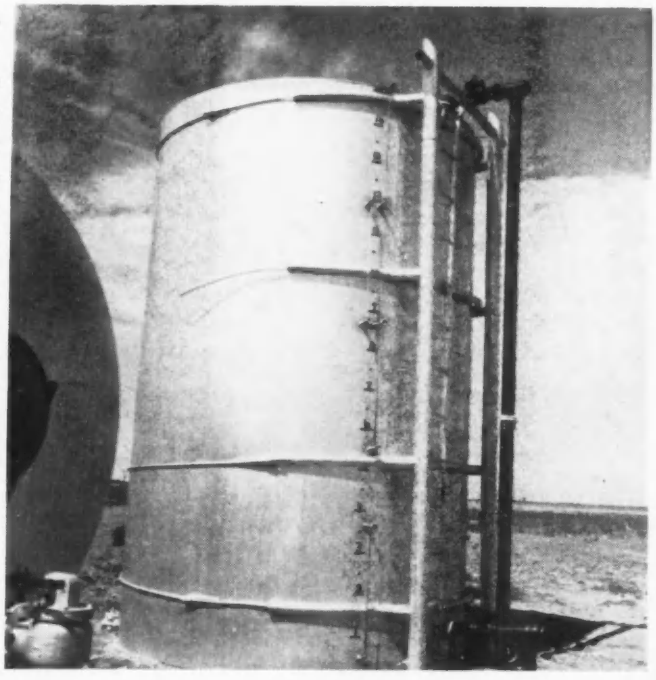
HINTS . . .

## Skid Mounting Water Tanks



Water tanks of a semi-permanent nature can be equipped easily with skids without welding directly to the tank. The tank shown here is used as an accumulator tank in a salt water disposal project in West Texas. A full-length skid was fabricated from four-inch pipe and equipped with half-circle saddles of two-inch pipe. Salvaged sucker rod was threaded through the saddles and clamped to hold the skid in place on the tank. Should the water disposal project be enlarged or discontinued, the tank can be moved quickly by disconnecting the inlet and outlet lines. Three-foot gauge glasses were mounted along the side of the tank to indicate height of water. These gauges were placed near one of the skid runners to provide protection for the glass tubes during transport.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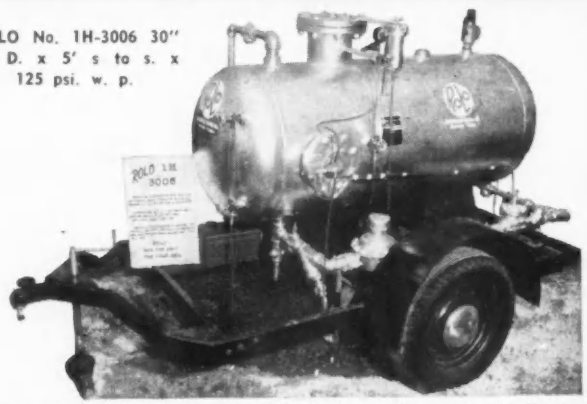

The Rolo No. 1H-3006 Wellchecker, shown above, was especially designed for testing in "water flood projects" and in fields where little or no gas is produced.

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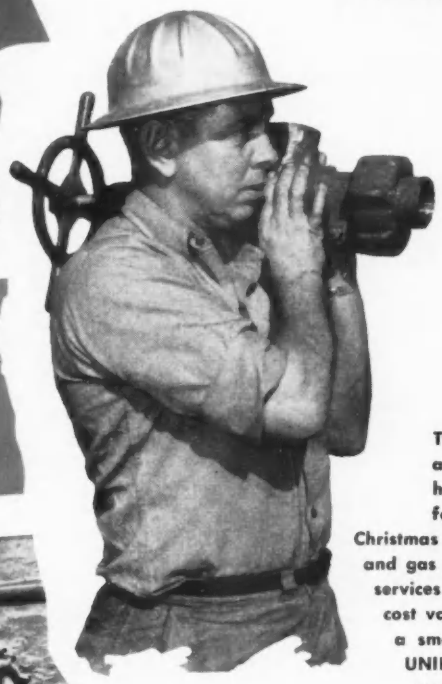

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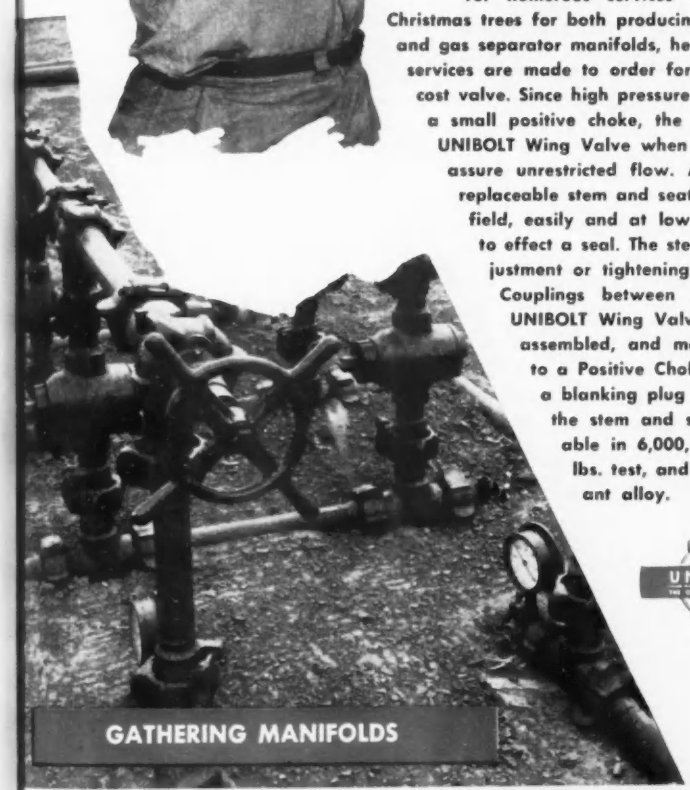

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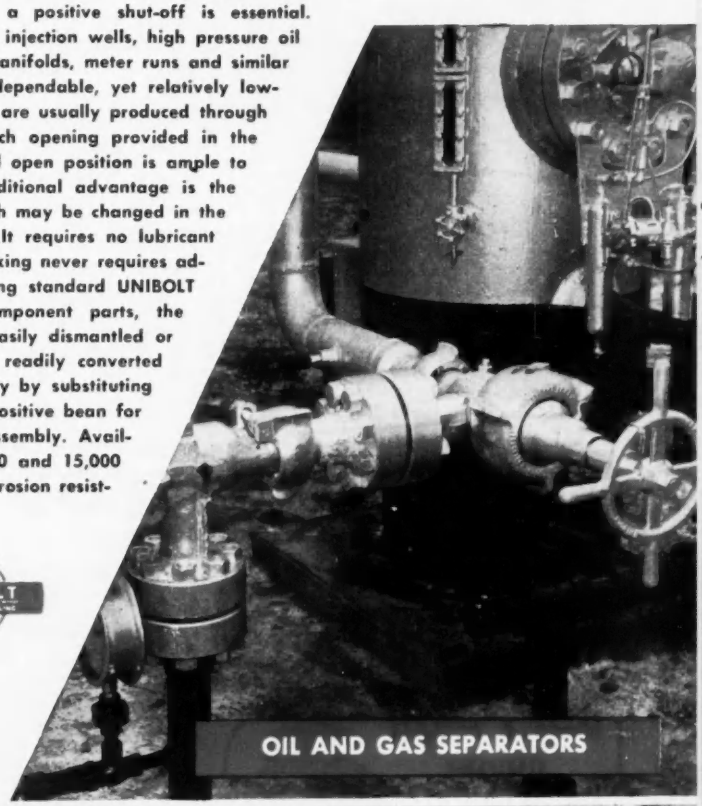

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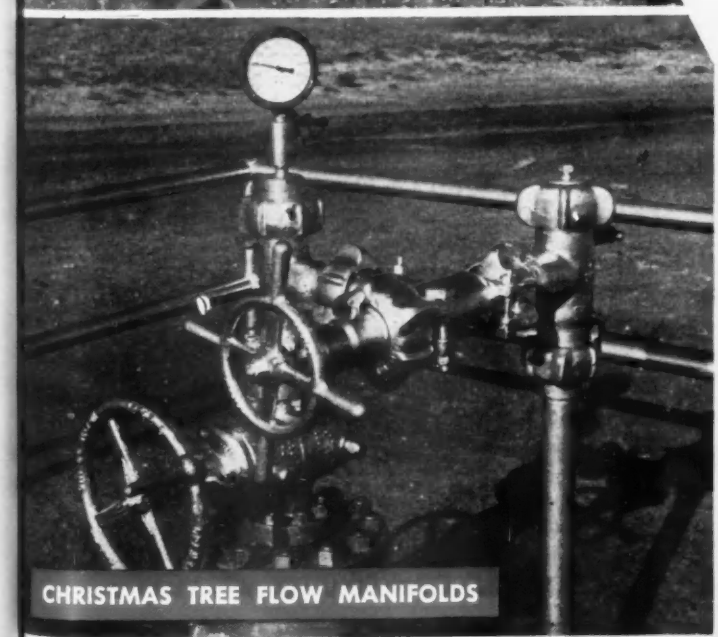

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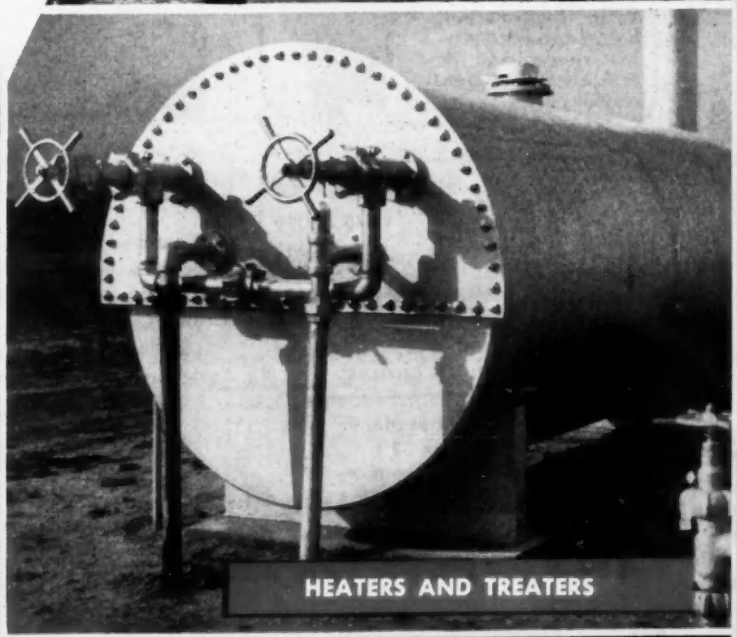

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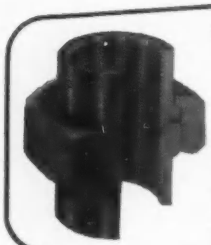

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# Cutting Pipe and Cable-Laying Costs

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A "mechanical" or "cable mole" digs a hole 18 inches underground, lays a two-inch pipe line and buries the line at the rate of 60 feet a minute. It will lay either cable or small pipe line at approximately half the cost of the conventional method. The "mole" can operate only in dirt that is relatively free of rock. If rock is encountered, it is necessary to use a back hoe.

The unit was assembled on the lease using an old subsoil rooter which is a two-wheeled trailer-type cart with a steel slab bed, mounted on an adjustable axle to permit the bed to drop down to within four inches of the ground. At the rear of the bed a thin plow consisting of a piece of metal shaped like a quarter-moon is attached. When the cart bed is lowered, the plow burrows into the ground and pushes aside the dirt, leaving a hole four inches wide, the size of the plow's nose. No gaping ditch remains on the surface because the plow's "arm" is only about one inch wide.

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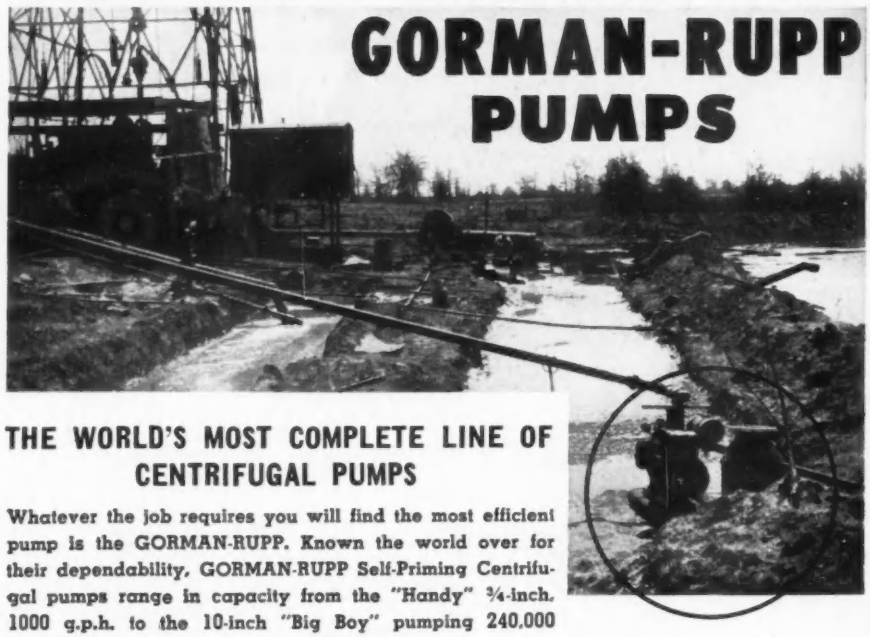

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into operation, the crew digs a trench 18 inches deep and from 15 to 20 feet long. Next, the pipe, which has been screwed together and laid out on the ground, is attached to the back of the plow. The small tractor which draws the cart pulls the pipe down through the prepared trench toward the starting point and the operation is under way. In laying cable the operation is even simpler and only a very short ditch is dug so that the "mole" can start its work. Cable is fed from a cable roll attached to the cart. As the narrow slit is dug, cable is unreeled down through a small tube which is attached to the rear of the plow.

## Installing Bypass Lines

Install bypass lines from separator to stock tanks at the battery so that they discharge directly into the manhole. This arrangement will permit the pumper to switch out any well on the lease for individual well test.

The line from the gunbarrel is installed in the usual manner with valves to the tanks at a convenient height for the pumper when he stands at the top of the stairway. Connect lines from the two separators so that the test separator may be connected into either tank, or the regular separator may be switched into either tank.

When it is necessary to put a well on test, the well can be switched into the test separator. If it makes considerable water, it can be run through the gunbarrel. However, if it is producing uncut oil, other wells on the lease are switched through the gunbarrel and the well on test is flowed directly into an individual tank.


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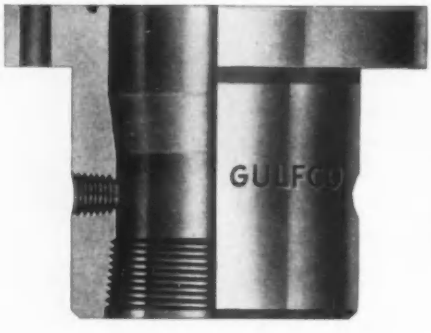


**TYPE RS CASING HEAD BODY**

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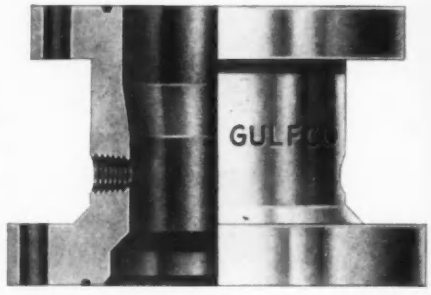
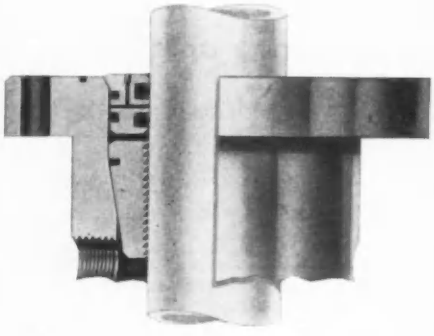
These Gulfco Forged Steel A.P.I. Full Opening Casing Head Bodies are designed for maximum practical flexibility. All hangers shown below are interchangeable in these bodies, giving the operator a varied choice of casing suspension, and the option of changing the casing program without removing casing head body. Type RS Casing Head Body can be furnished with male threaded bottom connection if desired.



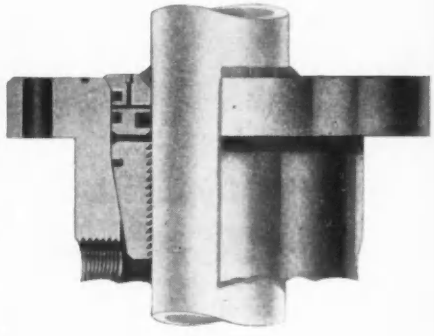



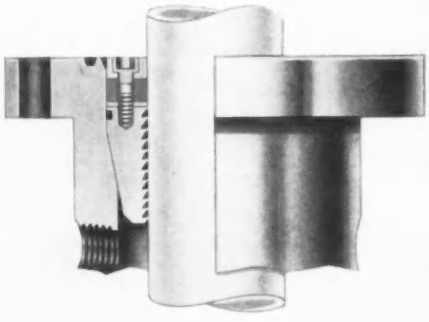
**TYPE RS-4 SLIP-TEST SEAL SUSPENSION**

This field tested seal owes its merit to simplicity in design, rugged construction and dependability in use. After the three-segment hinged slips are set with the proper tension on the casing, the pipe is cut at the desired length above the casing head flange. Then the seal is slipped over the pipe and the oversized synthetic rubber "O" rings effect a positive pressure seal in the annular space between the pipe and the I.D. of the casing head. The seal can be tested immediately without installing the next head or a test flange.

**TYPE RS-3 SLIP-TEST WELD SUSPENSION**

The slips used with this seal are identical to those furnished with the Type RS-4. The difference in the seals is that the Type RS-3 is provided with a bevel for welding around the pipe at the top. This type seal can be tested between the weld and the synthetic "O" rings without the use of a test flange and before the tubing head is installed.





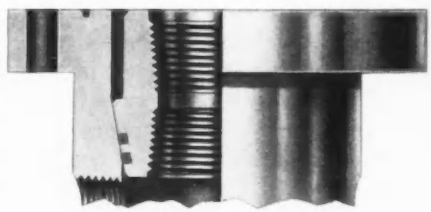
**TYPE RS-1 SLIP-PACK SUSPENSION**

This slip suspension hanger is made in three segments hinged together to assure perfect concentric alignment. After the cement has set, proper tension is taken on the casing and the slip-pack assembly is wrapped around the pipe and dropped to its seat.

The casing load is immediately taken by the slips, then the socket head cap screws may be tightened to compress the synthetic rubber packing and effect a positive seal.

**RS-2 THREADED SUSPENSION**

This "Boll-Weevil" Threaded Suspension hanger is simple, easy to install and has an unusually efficient hydraulic packing arrangement. When this type suspension is desired, the lower flange of the G-1F or G-2F tubing head is furnished with a ring of hydraulic packing which bears on the hanger and holds it firmly in position.

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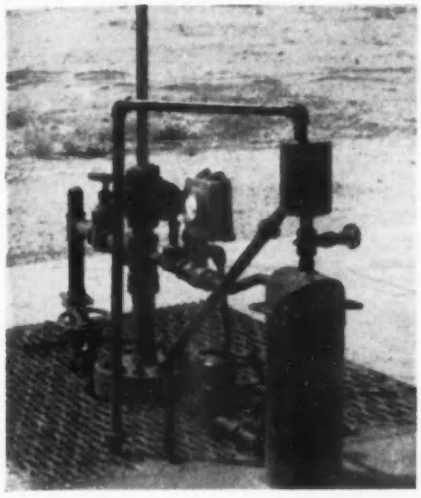


## Flushing Inhibitors

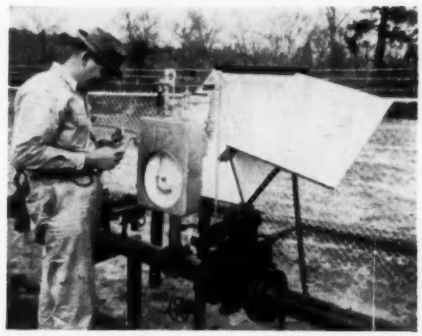
Corrosion inhibiting chemicals injected into the casing annulus of pumping wells can be flushed automatically by time-clock operated valves. With no packer in the well between the casing and the tubing, inhibitors may be injected into the casing annulus at the surface and allowed to flow down the sides of the casing to enter the bottom of the tubing string. In this manner, protection is provided throughout the full flow string, from bottom of well to tank battery.

Most efficient operations have resulted from flushing the inhibitor down the casing so that it is carried to the bottom of the well. This operation is done automatically by connecting the tubing head tee to the casing so that the oil is pumped down the flow line and into the casing bypass at the same time. Flush oil is limited by placing a time clock controlled valve in the bypass line. The amount of flush and the interval injected into the annulus can be regulated by settings on the clock.

A volume chamber in the bypass line cushions the flow and serves as a settling vessel for foreign matter in the oil. Chemical inhibitor is stored in one-barrel quantities at the well head and injected in the conventional manner. In this way, both operations, that of injecting, and flushing, are automatic, and only requires attention periodically when filling the storage tank.

## Protecting Meters

Protect recording orifice meters with an enclosure that may be removed easily for inspection and adjustment of meter parts. Where it is necessary to prevent freezing of the orifice meter recording mechanism in winter by installing a tight housing, many times the recording gauges become inaccessible due to bad construction of the enclosure. This type meter house may be folded back entirely away from the recorder so that it may be inspected, calibrated or repaired easily.



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WRITE FOR LITERATURE

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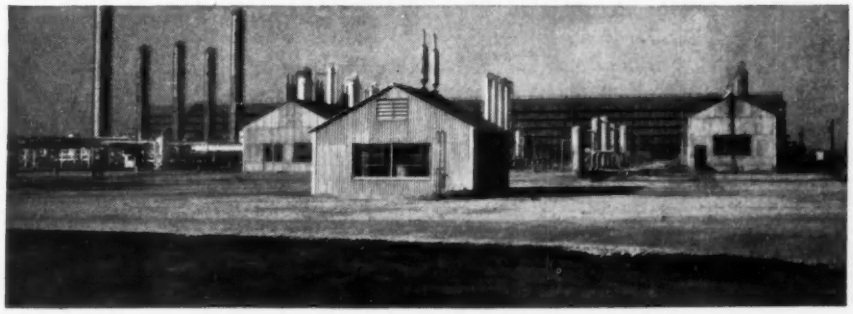

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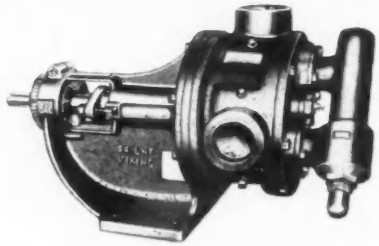

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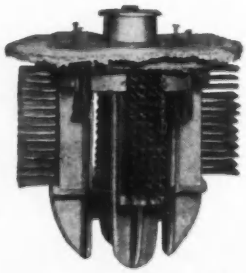
is the tool you need for dumping any amount of cement, sand, gravel, acid, or chemical, etc., in a continuous operation without interruption. The full open throat eliminates the hazard of stringing a load through the fluid column. There are no valves, sleeves, or ports to become fouled or clogged—no danger of accidental or premature unloading due to line whip or faulty brakes.



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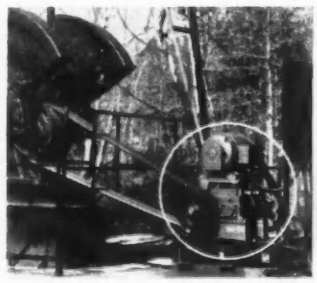

Typical oil field installation on single reduction pumping unit pumping 10, 13, 16 and 19 SPM.

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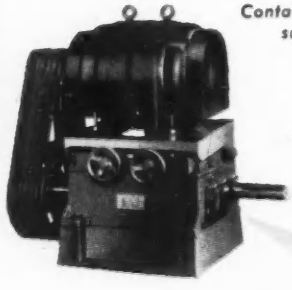

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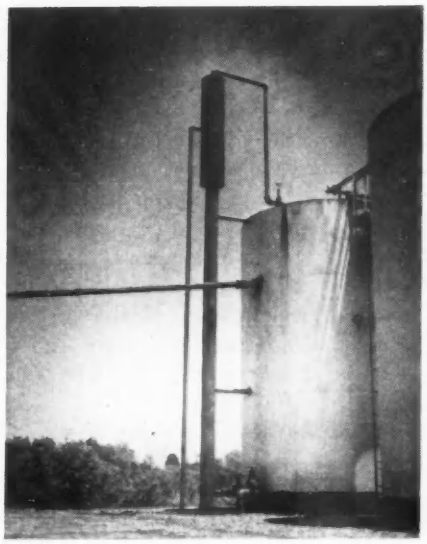
structed on pieces of angle iron which are welded together except in front, and welded to a support in the rear which is driven or cemented into the ground. It is fastened down to the angle irons with four bolts, two on each side. The two rear bolts are through matched holes, but the front bolts pass through holes in the meter house and into slots in the angle base. When it is necessary to fold the house back, the set screws are loosened on the front and the meter housing easily raised out of the slots.

Two doors on the front are made so that when opened, the entire front of the meter house is open, and this allows the meter to fit tightly over the connections and yet be easily laid back.



## Making Gunbarrel Boot

Make a gunbarrel from a regular stock tank by adding an outside "boot" as shown. This outside boot is made from 8⅝-inch casing and 16-inch casing, and extended well above the tank so that as much gas is drawn off as possible. Fluids produced into this gunbarrel tank require some heating and treating to break up a slight emulsion condition, and it is desirable to remove as much gas as possible. The enlarged section of 16-inch casing provides a large chamber to cause good gas separation.

The gas separation chamber is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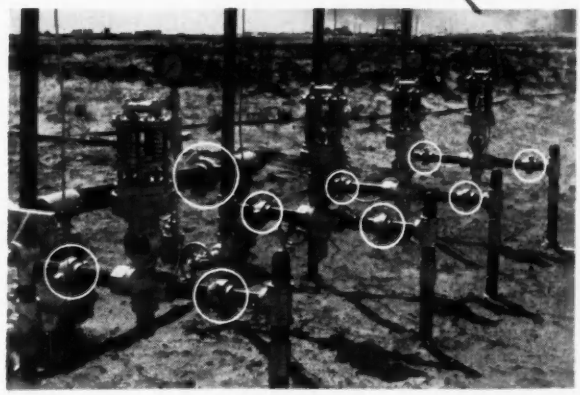
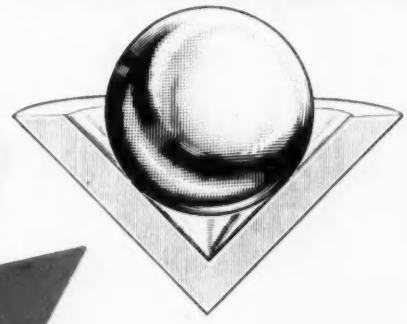
• Fig. 400 WECO Unions on a high pressure manifold.





Ball and Cone Seat

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This quality in WECO Unions is the result of precision machining of the Ball and Cone Seat, wherein the spherical surface on the male sub seats on the conical surface of the female sub. The true line of contact between these two metal surfaces produces a seal that holds against high pressures, shock, surge and vibration . . . that is practically impervious to damage.

Every union in the WECO line has this proven sealing arrangement. It is assurance that, regardless of your service requirements, the size or pressure union needed, you can depend on WECO Unions to seat properly and seal perfectly, everytime.

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mounted on top of the 8⅝-inch casing so that it is placed about two feet above the top of the tank. Connect the bottom of the boot into the bottom of the tank so that water and oil can flow into the tank. The two horizontal pipe braces attached to the tank are blanked off so that no flow of water or oil may pass through them. The sloping four-inch line connecting into the tank about two-thirds up the tank side is part of a thermosyphon system providing heat necessary to break the emulsion.

By locating the boot on the outside of the tank, leaks are easily noted, and this type of construction makes it simple to convert a stock tank into a gunbarrel. Fluids from the well flow into the boot at a point midway up the gas chamber on top.

*Courtesy Cities Service Oil Co.*

## Aiding Welders

Handy positioning jigs that hold small parts to be welded not only speed small and tedious welding jobs, but make it easier on the welder. This jig table is mounted on three legs, the third leg being a double one, and incorporates features which permit the work mounted on the table to be rotated as well as allowing the table to be set at angles from the horizontal to the vertical.

The vertical shaft on which the table rotates is welded to a "pie section" or quarter circle which serves as the angle positioning element. A salvaged valve hand wheel tightens the bolt extending through a slot cut inside the periphery of the quarter circle plate so that any angle desired may be fixed on the jig. The turn table has four slots through which jigs can be bolted to hold a variety of pieces to be fabricated. The jig table is on convenient height, and where volume work is involved, the welder can do the job from a sitting position. The complete unit is light and can be moved easily in the shop or transported to the field.

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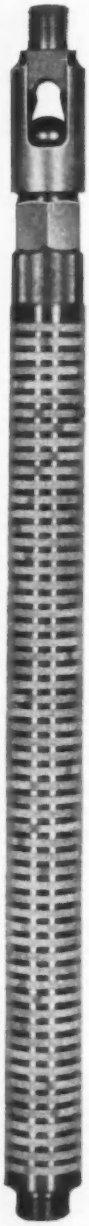
**• Share your ideas for a better way to do or make something. Send a picture illustrating your idea with a written description to The Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas.**

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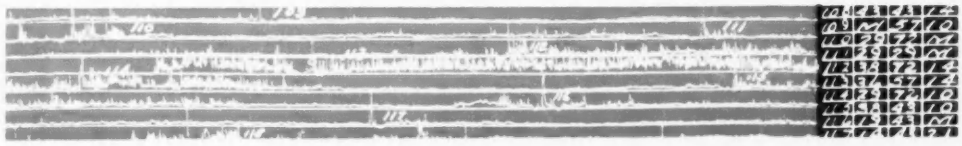

Now, after a winter of hard pulling, make certain that your wells will be ready for next winter. The risk of expensive fishing jobs and shut down time can be eliminated by periodic tubing caliper surveys. All Tuboscope caliper surveys feature the exclusive base line and give complete information on the internal condition of your tubing. Corrosion, erosion, rod wear, or a combination of these factors, can be determined in a single run by a Tuboscope Caliper Survey. You can be certain of the condition of your tubing after a Tuboscope tubing caliper survey without pulling good strings of tubing. Call Tuboscope now to survey your producing wells.

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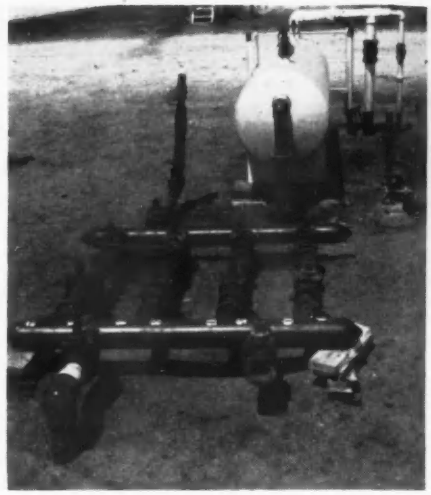
## Controlling Flow

Control the flow of oil from wells into a tank battery by a flexible header that saves connections. Four 2½-inch flow lines connect into this dual header that controls the flow of oil from the lead lines into either a heater treater or a test separator shown in the background. Unlike conventional headers they are erected vertically above ground, this installation is fabricated horizontally on the ground, resulting in saving pipe fittings.

Each lead line comes into the header underground and connects to each of the horizontal legs of the header from below, and are not shown in this illustration. Header in the foreground takes fluid to a heater treater, through which all wells on the lease flow. Wells under test are flowed through the test separator in the background. Two valves in each leg of the



header control the direction of flow into either header. Each lead line carries oil to the battery from two wells. It would appear that such an arrangement would complicate testing one well. However, there are only 11 producing days per well in this particular field, and when one well on a flow line is closed, the other well may be put on test. By combining two wells to one flow line, considerable expense is eliminated in lead lines and connections.

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*Courtesy Cities Service Oil Co.*

## Bending Pipe

Bending small-diameter pipe to relatively large radius bends in the field can be accomplished by using a fabricated "stiff" leg, chains and a jack or hoist. The pipe bender consists of a 10-foot section of four-inch pipe, to one end of which has been welded a saddle tee adequately braced, and two heavy eyes welded to the other end of this stiff leg. Half-inch chain is tied to the pipe and anchored to one eye at the end of the four-inch section. A jack or manually-

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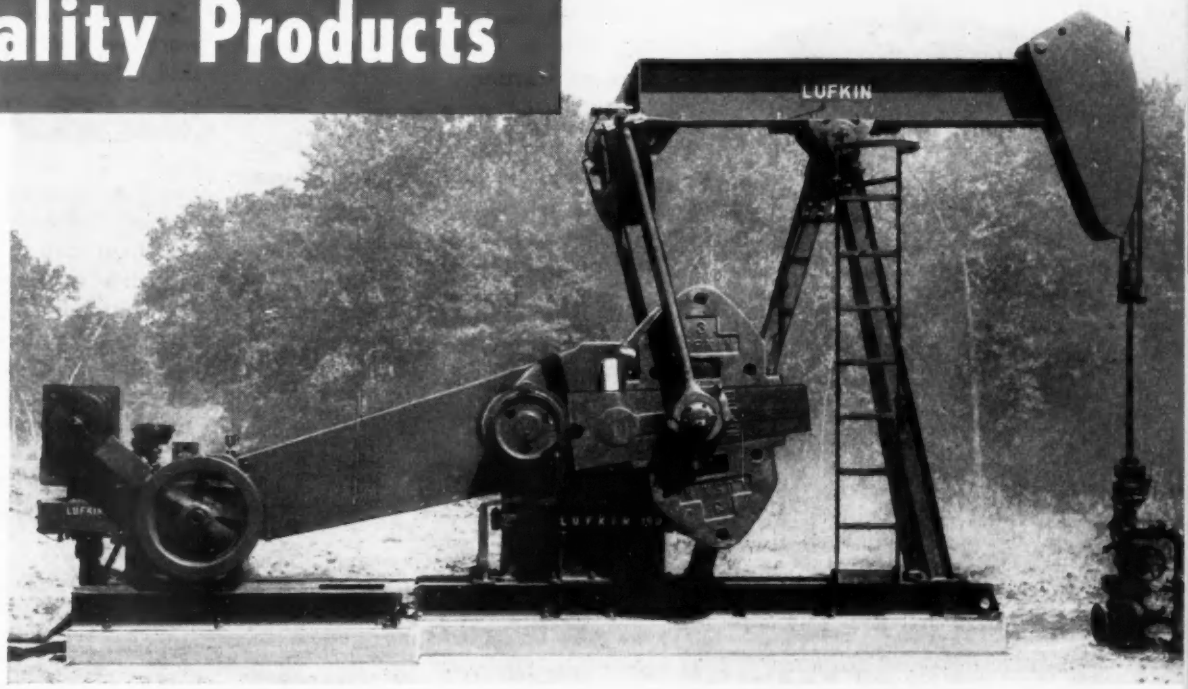


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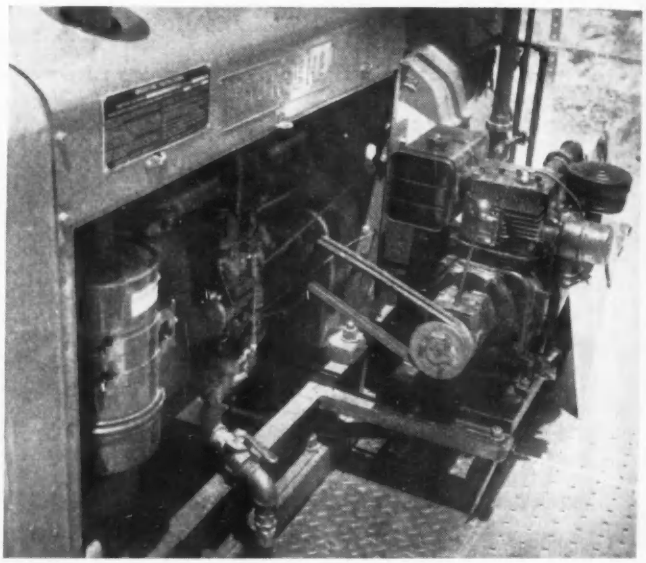
operated hoist is coupled to half-inch chain on the other leg. One man can take up on the hoist to bend the field line as shown. If the bend is a sharp one, it can be done in steps to eliminate any danger of the chains slipping on the line. This shop-made device eliminates bending with truck winches and attendant hazards to crew, or "jumping it down" by crewmen. This device has been a time and labor saver for gang crews.

## Starting Heavy-Duty Engines



Starting heavy-duty oil field engines can be made easy by this smaller gasoline engine which does all the work. For indoor locations, a battery and electric starter may be desirable. But for outdoor installations, batteries have been found to deteriorate rapidly, and fail when needed most. By installing this five-horsepower gasoline engine adjacent to a heavy-duty gas-fueled engine, ample power can be provided to turn the larger engine over for starting.

This installation is unique in that the two driving belts (two V-belts), are connected directly to the former bendix starting shaft. A double grooved V-belt sheave is attached to this shaft so that a direct drive is possible.

The five-horsepower gasoline engine is bolted to an angle-iron framework welded to the larger engine skid. This smaller engine is equipped with a clutch arrangement so that it can be started by hand before engaging the starting engine clutch. In this manner, the pumper can start the smaller engine before engaging the clutch to turn over the larger engine. There is nothing complicated about this installation, and adjustments and repairs are simplified.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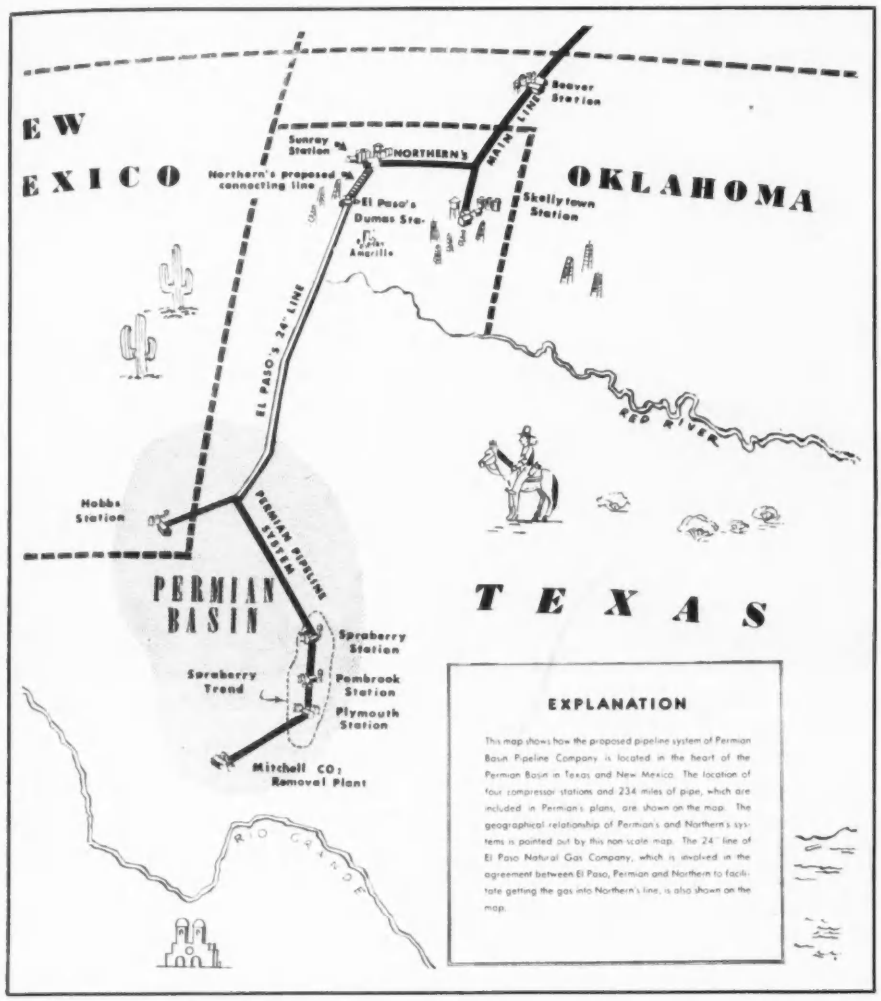

EW
EXICO
OKLAHOMA
TEXAS
Beaver Station
Sunray Station
NORTHERN'S MAIN LINE
Northern's proposed connecting line
El Paso's Dumas Sta.
Amarillo
Skellytown Station
EL PASO'S 24" LINE
RED RIVER
Hobbs Station
PERMIAN PIPELINE SYSTEM
PERMIAN BASIN
Spraberry Station
Spraberry Trend
Pembrook Station
Plymouth Station
Mitchell CO2 Removal Plant
RIO GRANDE
EXPLANATION
This map shows how the proposed pipeline system of Permian Basin Pipeline Company is located in the heart of the Permian Basin in Texas and New Mexico. The location of four compressor stations and 234 miles of pipe, which are included in Permian's plans, are shown on the map. The geographical relationship of Permian's and Northern's systems is pointed out by this non-scale map. The 24" line of El Paso Natural Gas Company, which is involved in the agreement between El Paso, Permian and Northern to facilitate getting the gas into Northern's line, is also shown on the map.

# Permian Basin to Get Important Gas Outlet

**New pipe line is scheduled to be in operation by the end of the year.**

BY YEAR'S END a new natural gas pipe line company will be operating in the southwestern U. S. The Permian Basin Pipeline Company, which will operate in West Texas and southeast New Mexico, was formed in May of 1950. But actual construction did not get under way until after May 1 of this year, when the FPC approved the Permian project.

When completed, Permian's gas gathering and transmission system will have facilities adequate for transporting a large volume of natural gas to Northern Natural Gas Company for resale in Northern's five state market area of Kansas, Nebraska, Iowa, South Dakota and Minnesota. Northern owns a controlling interest in Permian.

Permian's system will include four compressor stations, two dehydration plants, one sulphur removal plant, a carbon dioxide removal plant, a gasoline plant and a total of 234 miles of pipe line system.

Permian's compressor stations are located in the following manner . . . one is in Lea County, New Mexico, near Hobbs, and is named after that city. The other three, namely the Spraberry, Permbrook, and Plymouth Stations, are located in the Spraberry Trend area of the Basin.

Of Permian's total of 234 miles of pipe, 34 miles of 26-inch will carry gas northeast from the Hobbs station to a measuring station at Wasson in Yoakum County, Texas.

Seventy miles of 16-inch line will connect Permian's Carbon Dioxide Removal Plant in Pecos County to the Spraberry Trend to the northeast.

Thirty-four miles of 24-inch pipe will run due north and connect the three compressor stations in the Spraberry Trend from where a 96-mile stretch of 30-inch line will bring the gas northwest to Wasson, the location serving as a central delivery point for the gas from both the Hobbs area and the Spraberry Trend.

**Horsepower.** Permian's Spraberry Compressor Station will have the largest amount of horsepower installed. Construction there this year calls for the installation of 22,440 hp with another 3960 to be added next year, making a total of 26,400 hp.

Plans show that 10,800 hp will be installed this year at Permbrook, with another 5400 to be added in 1954, for a total of 16,200.

The third station in the Spraberry Trend, the Plymouth Station, will have 5600 hp installed in 1953 and an additional 1400 in 1954 for a total of an even 7000 hp.

The Hobbs Station in Lea County, N. M., the smallest in horsepower rating, will have 3960 at the end of 1953 and will have another 1320 installed in 1954 for a total of 5280 hp.

Permian's entire system, therefore, will consist of 42,800 hp at the end of this year and during 1954 will reach 54,880 hp.

The dehydration plant, one of the gasoline plants, and the sulfur removal plant will be located near Hobbs, and the other gasoline plant

will be near the Spraberry compressor station. As already mentioned, the site of the carbon dioxide removal plant is in Pecos County.

The cost of Permian's system is approximately $42 million. The first year's installations should be completed by the end of December.

Construction on the new pipe line company's system is progressing at a rapid pace. As of the first of September, all of the construction was completed on Permian's 24-inch line in the Spraberry Trend with exception of valve installations and line-testing.

On the long stretch of 96 miles of 30-inch between the Trend and Wasson, all of the right-of-way had been cleared, more than 70 percent of the pipe strung, and over 50 percent lowered-in.

The entire construction of the 34 miles of 24-inch line from the Lea County, N. M., area to Wasson was virtually finished, being rated at 99 percent complete.

Pipe line contractor for Permian's mainlines is R. H. Fulton of Lubbock, Texas. Construction was also progressing on the compressor stations. Contractor for compressor construction of the three stations in the Spraberry Trend is Fluor Corporation, Ltd., of Los Angeles. Dresser Engineering is the contractor for the Hobbs station. With the exception of the Hobbs stations, all the engine blocks had been poured as of September 1. The foundation walls were 50 percent complete at the stations.

**MAP OF PERMIAN'S NEW SYSTEM** is checked by Permian Basin Pipeline Company vice presidents Larry Shomaker (left) and John Hanley. Map shows Permian system and relation to Northern Natural Gas Company's main line.

**Via El Paso's Line.** To facilitate delivery of gas to Northern, Permian has negotiated a transportation agreement with El Paso Natural Gas Company, which involves the use of 203 miles of 24-inch line belonging to El Paso and running between Wasson and El Paso's Dumas Compressor Station, some 14 miles distance from Northern's compressor station at Sunray, Texas.

For some years El Paso had used this line to transport gas it purchased in the Panhandle area southwardly to a point near Wasson where the line connected with El Paso's main line heading for California—its principal market.

Under the terms of the agreement El Paso will now reverse the flow of gas in this 24-inch pipe line and send gas northward to its compressor station near Dumas. Northern will build a connecting line to bridge the 14 mile gap between its Sunray Station and El Paso's Dumas Station.

In actuality the contract will work something like this . . . Permian will deliver to El Paso in the Permian Basin area a minimum of 100 Mmcf daily and a maximum of 300 Mmcf. El Paso, in turn, will make available for delivery into Northern's system a like amount of similar gas at its Dumas station in the Panhandle.

El Paso will receive a considera-

**CONSTRUCTION SPREAD** making a mile a day through West Texas. In most locations crews are hampered by sub-surface rock. Three stringer-bead welders and four hot-pass welders set the pace. Welding machine trailers are mounted on tracks.

**FIRING LINE WELDER** moves ahead. Bus in background takes pipeliners to and from work.

tion of two cents per Mcf for delivery of gas at Dumas.

This agreement eliminates the obvious cross-hauling of gas that would have existed if Permian had constructed a line similar to El Paso's. To Permian, the agreement also meant a saving of about $15 million in plant investment, or more than a 25 percent saving in construction costs.

**Capacity.** In terms of capacity, Permian's system will mean an additional source of supply to Northern Natural amounting to 200,000,000 cubic feet daily by the end of 1953, and an increase to 300,000,000 cubic feet daily during 1954. The effect of these increases will result in Northern's system salable capacity reaching 1007 Mmcf this year, and 1100 Mmcf by the end of 1954. The 1007 Mmcf program for 1953 will make it possible for Northern to satisfy the demands of its present 26 utility customers according to the needs they expressed in 1952 for the heating season of 1953.

When the 1007 figure is reached, Northern's daily system capacity will have increased by more than 400 percent since 1944 during World War II when it stood at 243,000,000 cubic feet.

**Reserves.** In seeking gas to support the large expansion program had in mind for 1953, the Permian Basin area proved to be a good area to which to turn.

The Basin comprises 76,610 square miles of Texas and 12,000 square miles of Southeastern New Mexico, or 88,610 square miles in all.

It is rather ironic that the Basin has been established as an important source of natural gas. For this was the area that Coronado's conquistadors explored in 1541, fruitlessly seeking mythical cities of fabulous riches. Little did these adventurers realize that although their search for wealthy cities was in vain that some day this very land would be of immense value because of the large deposits of mineral wealth left by nature in the subsurface strata.

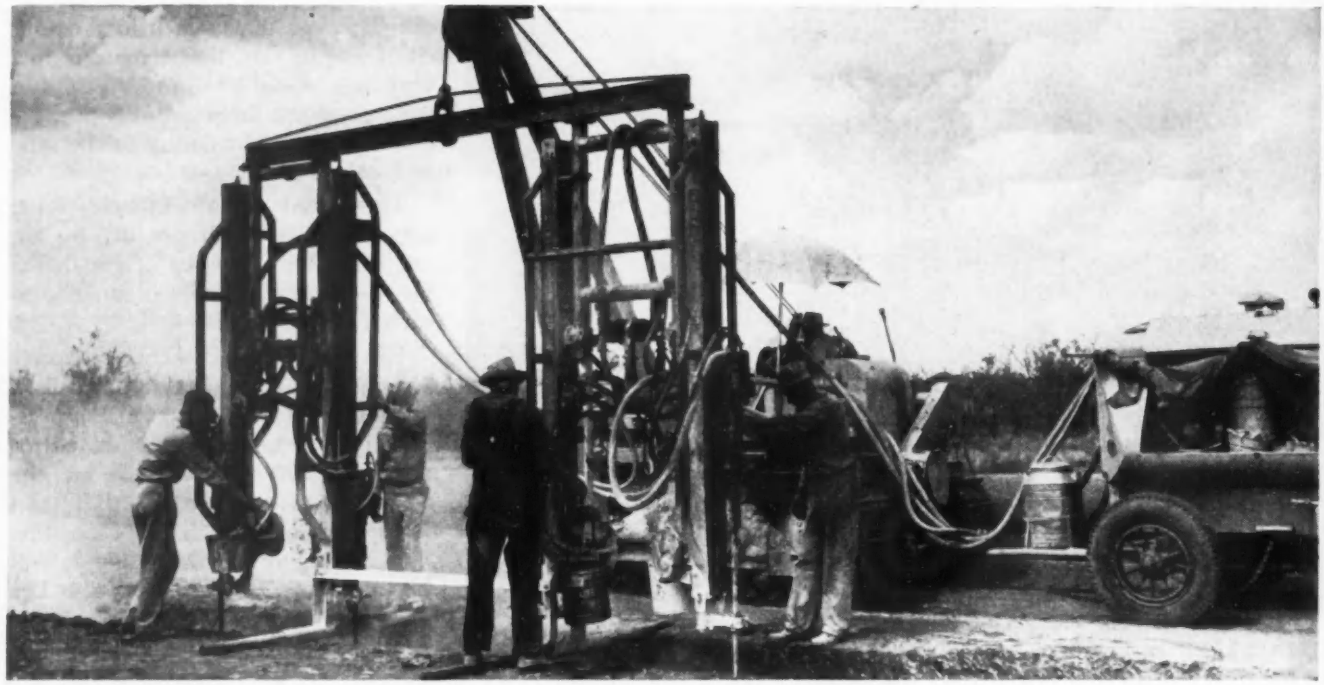
The Permian Basin includes some dry gas wells which produce no oil, but the primary source of gas in the area is residue gas which can be obtained from oil wells.

Permian Basin Pipeline Company has reserves estimated at 2.7 trillion cubic feet under contract at the present. The company has negotiated to purchase 200 Mmcf daily in the Spraberry Trend area of the Basin from Phillips Petroleum Company. The balance of Permian's supply will be principally dry gas from the Lea County, N. M., area to be purchased from a number of producers.

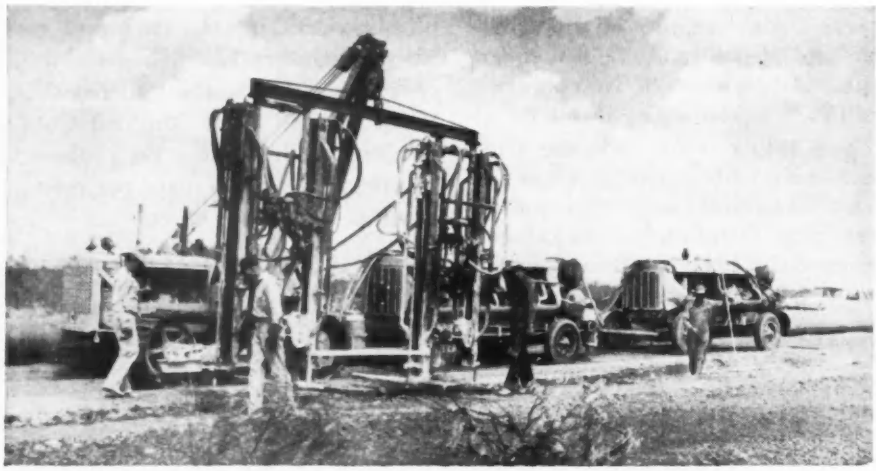
Permian's new pipe line system will particularly prove a valuable outlet for the Spraberry Trend where for some time a vast economic wastage of gas, caused by the flaring of gas by oil producers, has existed. Oil well operators were recently ordered shut down by the Texas Railroad Commission, but have since been allowed to operate on an 11 days per month schedule if no gas is flared.

**Continued on next page**

**STATION CONSTRUCTION** is underway. In background is Phillips gasoline plant.



**1** Four-gang drills punch four holes every two minutes into West Texas rock. Assembly was devised by M. L. Boyd, R. H. Fulton, spread superintendent. Note that frame is supported by two pieces of pipe across ditch.



**2** It takes only a few seconds to move the drill.

**3** Loading the hole with explosives. One stick about midway up the hole is fused. Covers on all sticks are ripped to get maximum result from charges.

## ditching machine makes a mile a day through rock . . .

DRILL IT—shoot it—back-fill it—and then ditch it with a ditching machine. That's the way the R. H. Fulton spread makes a mile of ditch a day in laying the Permian Basin line through rock of West Texas. And the ditching machine is doing the work that would ordinarily require about eight backhoes.

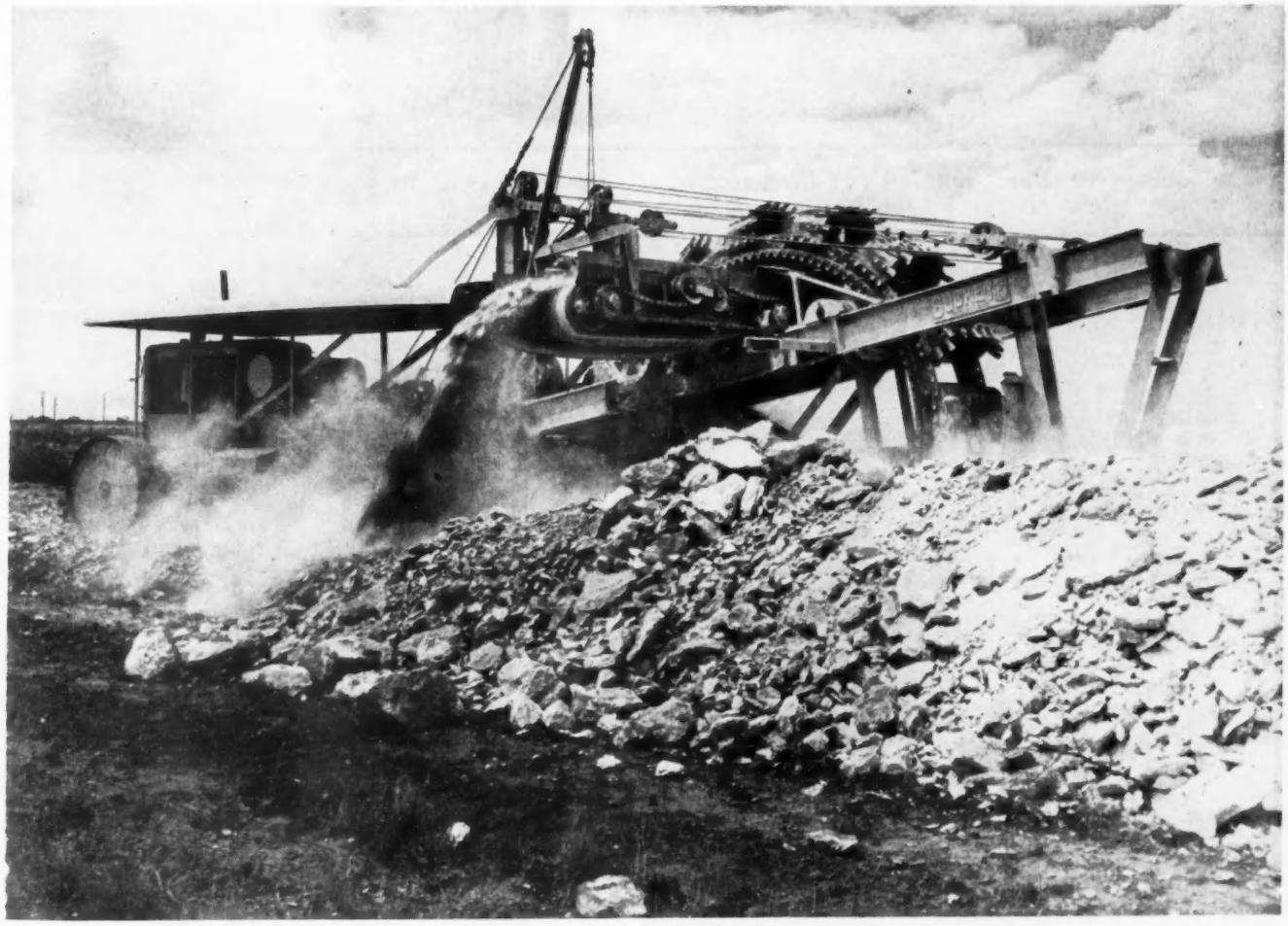
Actually, there are two ditching machines. One moves ahead, stripping top soil off the rock and even cutting the ditch where the soil is deep enough.

Next come the drills. M. L. Boyd, Fulton's spread superintendent, worked out an ingenious way of mounting four drills on a single frame. This assembly punches four holes as quickly as one. Two of these four-gang drills work the ditch on opposite sides to drill staggered holes one foot apart down the ditch line. This close spacing gives good breakage when the ditch is shot.

After shooting, a bulldozer back-fills and levels the ditch. Then a second ditching machine cuts the ditch for the pipe.

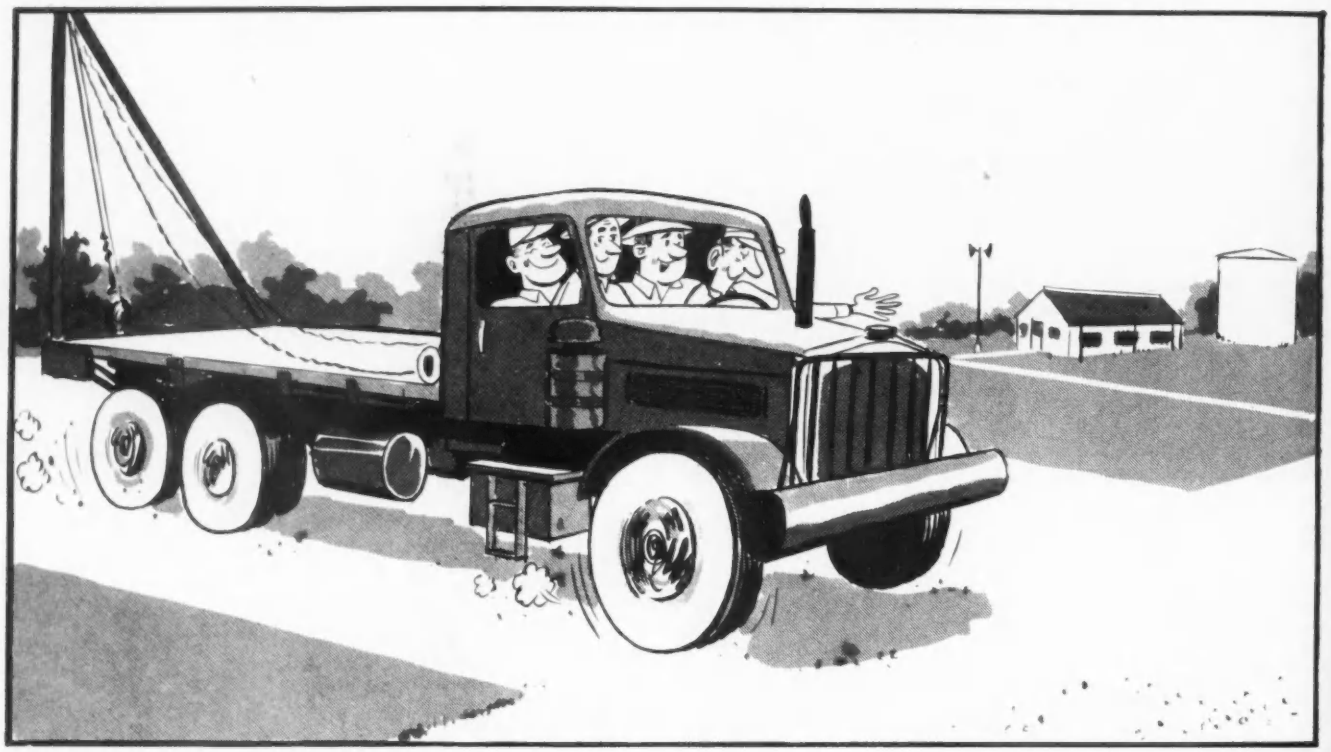
**4** Shooting 1,570 feet of ditch with one shot saves time. Fewer shots means less work stoppage.

**5** After the blast, bulldozer backfills and levels ditch to provide firm footing for ditcher.

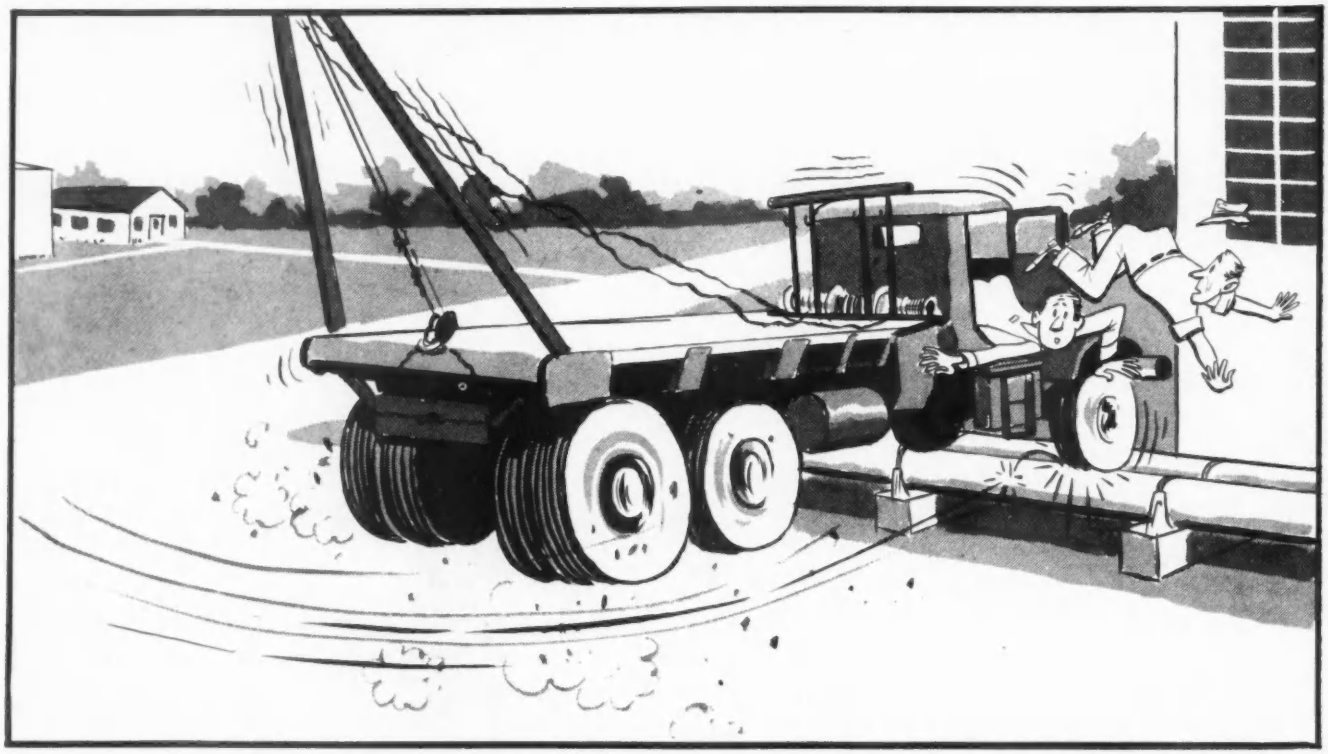


**6** Ditching through rock . . . it's tough going but pays off by saving labor and equipment. Using a ditching machine for this job eliminates six or eight back-hoes that would be necessary to cut the ditch.—**The End.**

# Perils of Pipeline Pete



Pete signaled . . . then turned . . . the hard way, he learned . . .



. . . two's plenty . . . three's a crowd . . . four in front will buy a shroud!

THE powerful, dependable Cat* D397 Oilfield Engine above plays a double role for Socony-Vacuum Oil Company, Inc.

Driving a Byron Jackson Multiplex 4x6 R. B. pump, this compact, power-packed engine is used for emergency duty at stations along the line. But while it waits, it works! It pumps about half the total capacity at the Berland Station near Zurich, Kan. But despite its tremendous capacity for work, it can be moved easily and set into operation in a matter of hours in some far-off station.

How much does this double-duty operation cost? A fraction of a cent per barrel! The D397, like all Cat Oilfield Engines, is designed to operate on low-cost, non-premium, No. 2 furnace oil without fouling. *Most models perform on crude oil.*

Maintenance costs are low, too. Fuel, air and lube oil filters, and seals keep dust and abrasives out of the engine. Normal maintenance can be done in a few minutes. It's a simple matter of changing the lubricating oil and cleaning and changing the filters.

Leading manufacturers of oilfield equipment can supply Cat Diesels in their products. Engine and electric sets are available in 12 sizes up to 500 honest HP and 315 KW. Your Caterpillar Dealer is ready to prove how these engines help cut costs and build profits.

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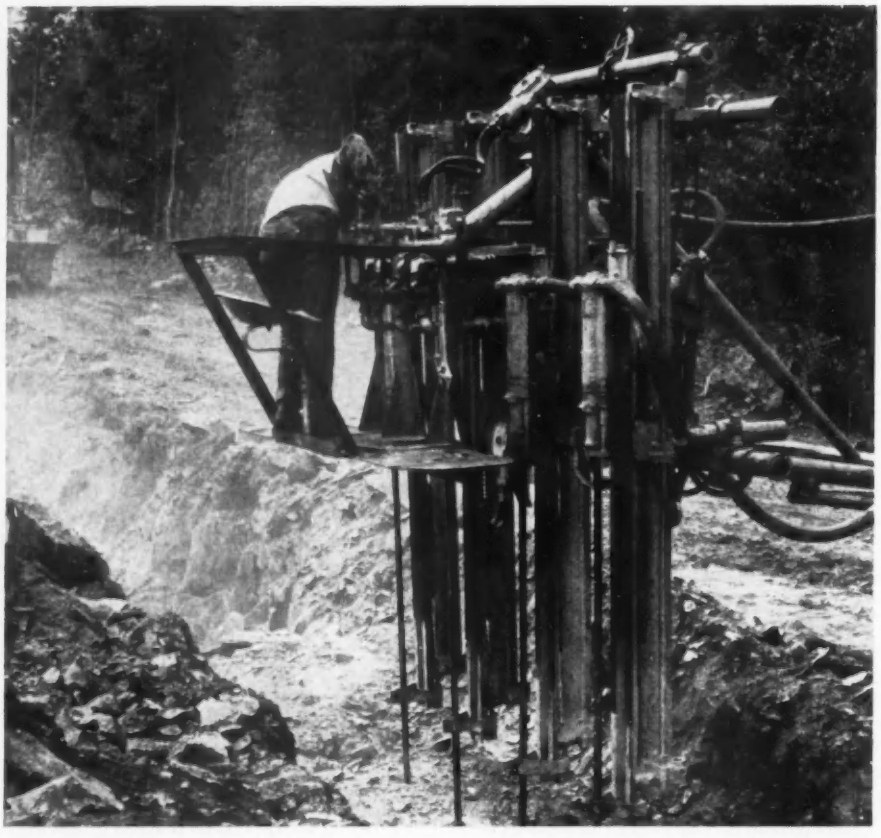
# WHAT'S HAPPENING

# IN PIPE LINE CONSTRUCTION

By **THERESA K. MARTIN,** WORLD OIL Staff



**ONE MAN OPERATES FOUR DRILLS** making short work of drilling rock. He can operate each drill separately with pneumatic controls in front of his seat. When one of the drills gets stuck in the rock, the rig is lifted up and the drill left in the rock, to be blown out by the shot. Meanwhile, another drill is easily inserted in the rig and the work goes on.

## Pipeliners Fight Rock on Lakehead

One of the most difficult stretches of Lakehead Pipe Line Company's 643 mile long 30-inch pipe line that runs from Superior, Wis., to Sarnia, Ontario, was constructed by Midwestern Constructors, Inc. Even though the construction crew fought rock and swamp all the way, excellent progress was made.

A new four-gang wagon drill assembly contributed to the progress. This device enables one man to operate four drills at once sitting on a seat above the drills.

Very little ditch on this spread was cut by ditching machines. Ordinarily subsurface water was encountered at a depth of two feet causing vertical banks of the ditch to cave. Another problem that plagued Midwestern's spread was the numerous vacation sites and golf courses the line crossed. This called for careful removal of grass and top soil ahead of construction crews. After back fill was complete, the pipeliners were forced to virtually landscape the right-of-way.

**DITCHES FULL OF WATER** were common through northern Michigan on Midwestern's spread. Water usually was encountered at a depth of two feet causing verticle banks of ditches to cave. This meant that most ditching had to be done with backhoes.

**DRILLS ARE ADVANCED** in a matter of seconds by the sideboom tractor which also pulls the two air compressors which furnish power for the drills. Shooting crews follow closely behind the drills. This mobile equipment is readily advanced down the right-of-way when skips in rock are found.

# PIPE LINE PROGRESS

Dope gang preparing a string of A. O. Smith 26-inch welded steel line pipe for lowering in on the West Texas Gulf Pipe Line.

## Biggest Inch to carry 381,000 bbl. per day from Permian Basin area

**The West Texas Gulf** Pipe Line, completed last February, is the largest single carrier of crude oil in this country. It has 465 miles of 26-inch pipe which extends from Colorado City in west Texas to Lucas, just outside Beaumont.

**Present capacity** of 301,000 barrels per day is being increased to 381,000 by the addition of intermediate pumping stations. Ultimately, capacity can be increased further to an estimated 440,000 barrels per day.

**Crude oil** from the Permian Basin area, containing more than 20% of the nation's oil reserves, is delivered to the Beaumont area and, through a 20-inch branch of 112 miles, to Longview, Texas, where it connects with other pipe lines serving Great Lakes and Ohio River valley refineries.

**A considerable mileage** of the 26-inch line is of A. O. Smith welded steel line pipe produced in Milwaukee and Houston. We are proud to have contributed to the construction of this, the Biggest Inch, as we have also to virtually every important petroleum products pipe line in the world.

*A. O. Smith Line Pipe is available in a complete range of sizes and wall thicknesses, from 8⅝-in. to 36-in. diameters.*

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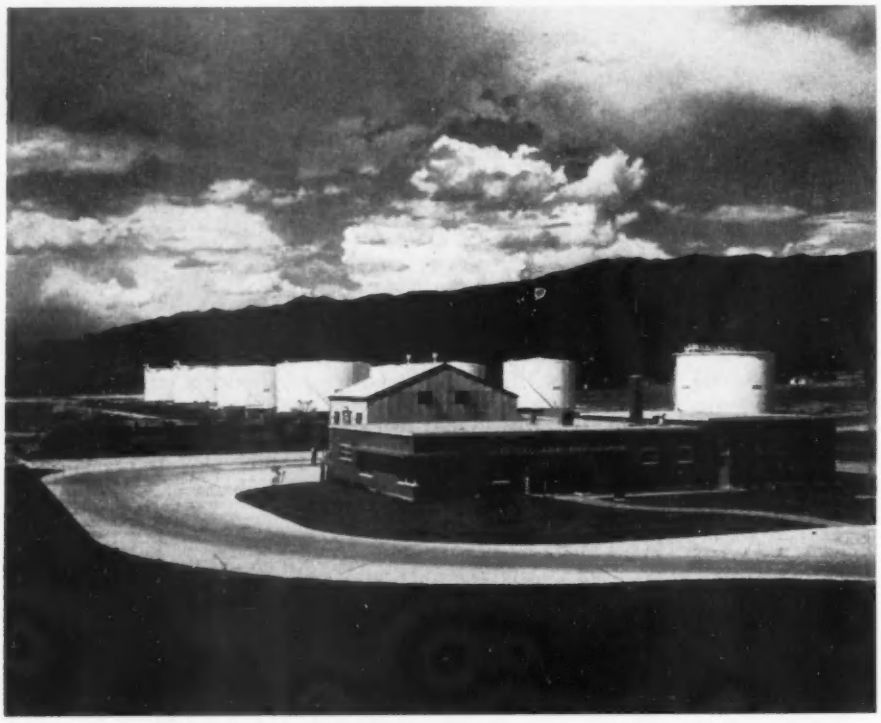
**DEPENDABILITY THROUGH RESEARCH AND ENGINEERING**



**PIONEER PIPE LINE SYSTEM**, which was dedicated at Salt Lake City in August, is a 290-mile, 8-inch line jointly owned by Continental Oil Company and Sinclair Pipe Line Company. Photograph at top shows the type of rugged terrain over which the line lies. Below is the Salt Lake City terminal where storage facilities for 500,000 barrels of crude are provided.

## Southern Counties Gas Gets Authorization for Short Line

The FPC has authorized Southern Counties Gas Company of California of Los Angeles to construct 14 miles of line to provide additional capacity to meet increasing demands in Orange County, Calif.

The proposed project will include about 72,000 feet of 24-inch pipe and 1000 feet of 22-inch pipe extending from a point on the company's 30-inch Blythe-Santa Fe Springs line near Brea, to Santa Ana, Calif. Estimated cost of the new facilities is $879,962.

## FPC Authorizes Proposal To Export Gas To Canada

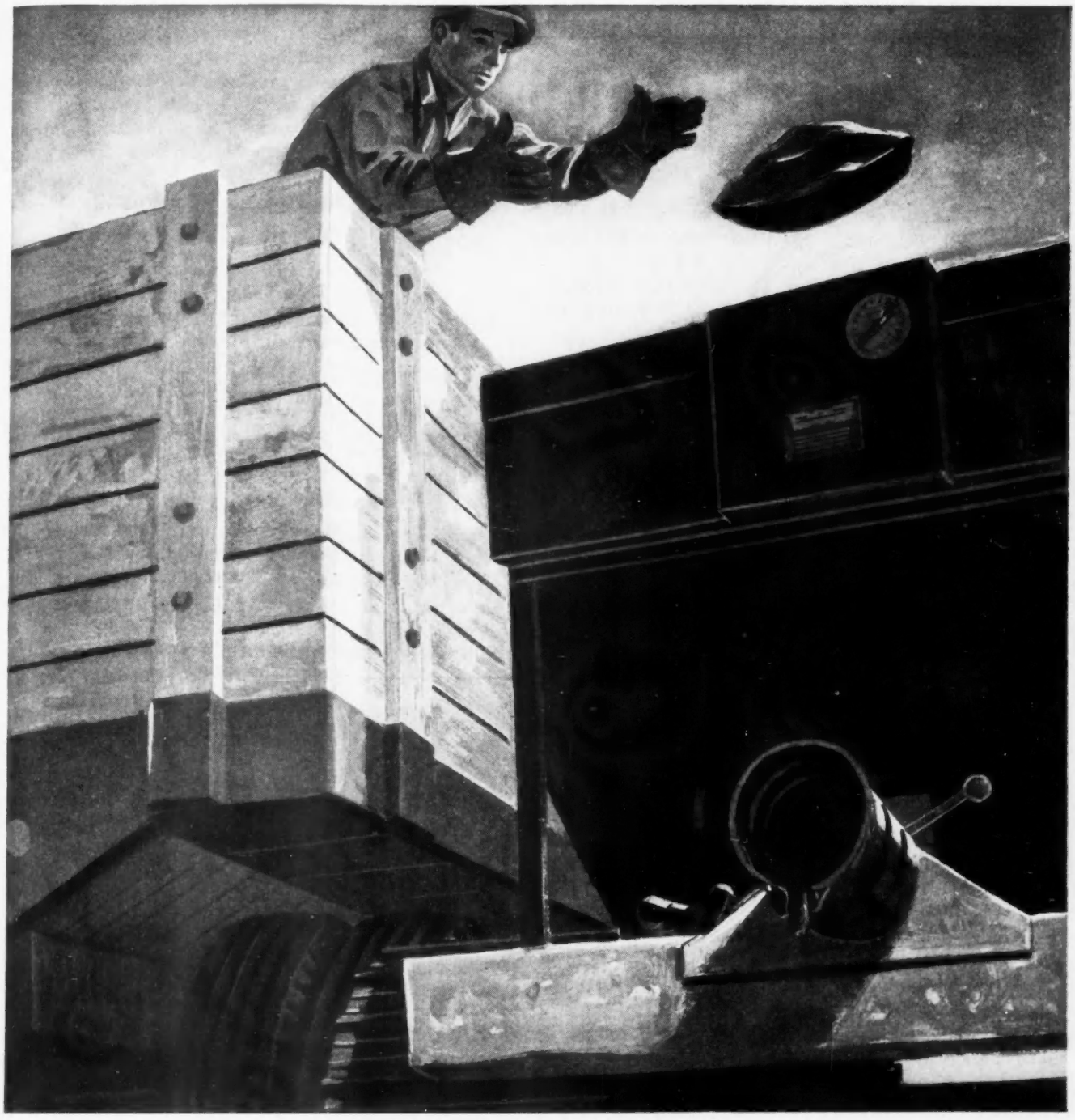
Tennessee Gas Transmission Company of Houston and Niagara Gas Transmission Limited of Toronto, Canada, have received FPC approval of their application to export natural gas from the U. S. for ultimate consumption in eastern Ontario, Canada. Tennessee was also authorized to transport natural gas for delivery to Iroquois Gas Corporation, of Buffalo, N. Y. The Houston company would act as transportation agent, transporting gas purchased by Iroquois and Niagara.

TGT will increase its pipe line system capacity by the construction of a 574-mile 30-inch line from Kinder, La., to join their system at Portland, Tenn.; 130 miles of loop line in Texas, Louisiana, Ohio and Pennsylvania; a 45-mile 20-inch spur line from the TGT line near Buffalo to the U. S.-Canadian border near St. Catharines, a submerged crossing of the Niagara River; 17,250 additional horsepower at existing compressor stations, and 21,280 hp in three new compressor stations near Yazoo City, Miss., Moorehead, Ky., and Findley Lake, N. Y., plus 158 miles of lateral pipe lines in Louisiana and Texas.

## Pacific Northwest Presents Supplement To Application

The FPC has received a supplement to the third amended application filed by Pacific Northwest Pipeline Corporation of Houston in connection with its plan to construct a natural gas transmission system extending from the San Juan Basin in New Mexico and Colorado to market areas in the Pacific Northwest.

By the supplement, the company proposes to include: (1) additional supplies of natural gas from the Big Piney field, Sublette County, Wyo.; (2) new supplies of natural gas from the Piceance Creek field, Rio Blanco County, Colo., and in the Tip Top field, Sublette County, Wyo.; (3) extension and expansion of the proposed Big Piney lateral line; (4) new supply lateral lines to, and a gathering system dehydration plant and booster station in, the Piceance Creek and Tip Top fields; and (5) elimination of 23,300 horsepower main line compression south of the point where the Big Piney lateral connects with Pacific's main transmission line.



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Barrett Advisors assist you in the planning stage. You are assured that your pipeline investment will receive the best protection at lowest cost. Barrett Service Representatives follow through at the pipeline site . . . checking, advising and supervising applications until the pipe is *safely* underground.

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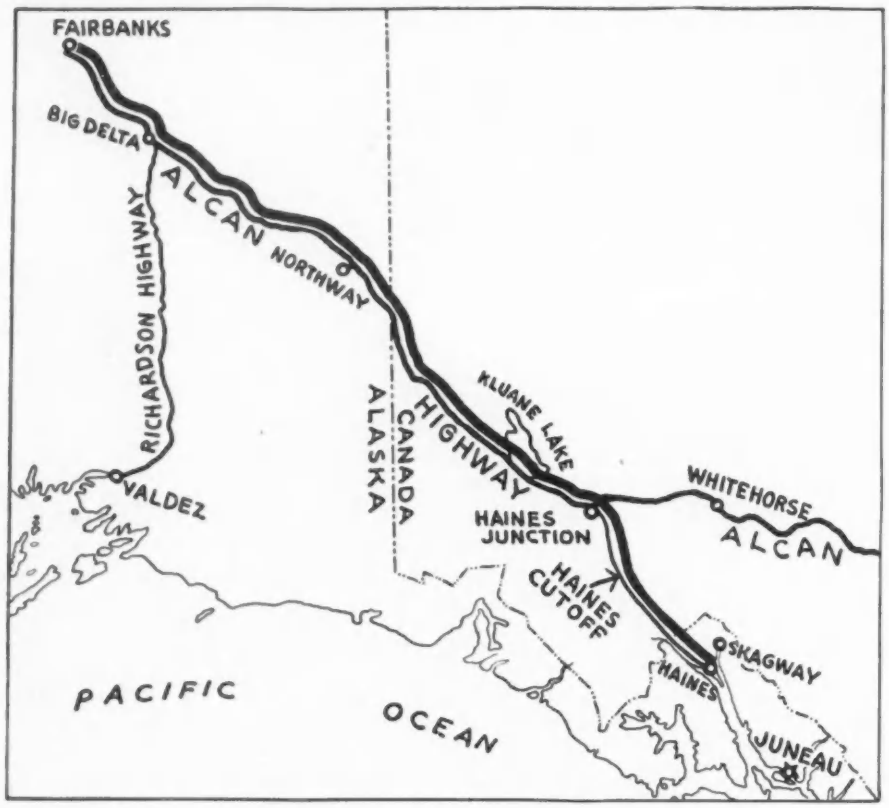



**PROPOSED HAINES-FAIRBANKS LINE.** Heavier line denotes route of pipe line.

# Bids on Alaskan Line Open

Alaska District Corps of Engineers asked for bids on August 29, and bids will be opened October 14 on the Haines-Fairbanks petroleum products pipe line project.

The work involved in the project includes the furnishing and laying of 615 miles of 8⅝-inch welded steel pipe line, the construction of a terminal wharf at Haines, five pump stations, all complete with utilities and four complete with supporting facilities; terminal facilities near Fairbanks, two intermediate take-off facilities, and two tank farms. Three of the pump stations are to be located in Canada. Estimated cost is $40 million.

The line will start at Haines, south of Skagway, and will be laid by way of the Haines cut-off to Haines Junction, a point on the Alaska highway in Canada. From there it will pass through 284 miles of Western Canada, crossing mountains, rivers, canyons, and miles of open land to Fairbanks in central Alaska. Approximately 435 miles will be surface laid and 180 miles buried. Much of it will parallel the Alaska highway passing near the 14,000 to 16,000-foot peaks of the St. Elias and Wrangell mountain ranges. Traversing areas of permafrost, the permanently frozen earth of the Arctic, and muskeg swamp, the line will make an 8½-mile crossing of the 290 feet deep Kluane Lake, north of Whitehorse in Canada's Yukon Territory. There is an alternate arrangement by which contractors may bid to take the line around the edge of the lake. This alternate would add approximately six miles to the length of the pipe line.

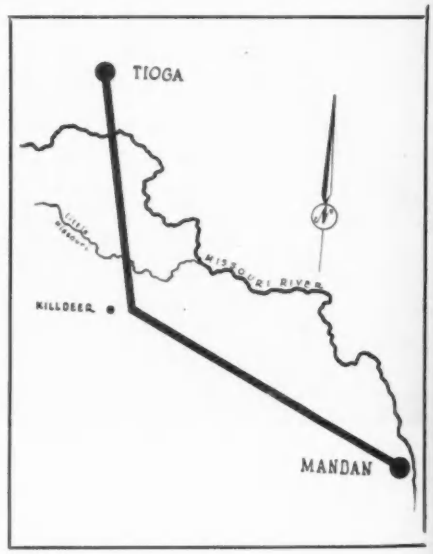
The Army Engineers corps said it had hoped to get the construction under way during the coming winter. Construction is expected to require more than a year. Because it will involve difficult engineering problems no target date has been set for completion. When completed the line will provide a protected route over which motor and aviation gasoline and jet and diesel fuel can be carried from mainland U. S. to the army and air force bases in the Fairbanks region.

## New Line to Be 80 Feet Beneath Lake's Surface

Service Pipe Line Company of Tulsa, Okla., is laying a line across the bed of the future giant Garrison reservoir and the Missouri river channel that eventually will be under 80 feet of water. The pipe line will be the state's principal outlet for its crude oil production. The Missouri crossing is 18 miles south of Tioga.

Two and three-tenths miles of heavy river pipe will be laid in the bed of the reservoir with 1900 feet in the channel of the Missouri river. The pipe, with a one-half-inch thick wall, weighs 65.42 pounds per foot and is 12 inches in diameter. Coatings of coal tar enamel and concrete will increase the weight another 50 pounds per foot.

The company also will build a line beneath the Little Missouri river. Pipe beneath this stream will be 16 inches in diameter and will weigh 82.77 pounds per foot with the protective coatings increasing the weight to 172.77 pounds.




Pentzein, Inc., of Omaha, Neb., as sub-contractor for O. R. Burden Construction Corporation of Tulsa, is building both river crossings. The Burden organization has the over-all contract for construction of the 154-mile line.

# HERE'S TRACTOR-SIDE BOOM CONTROL

## that lets you concentrate on the job

Cradling or lowering-in pipe on steep hillsides or mucky swampland demands a crawler operator's full attention—that's why easy-handling Allis-Chalmers tractors and side booms mean so much to a smooth, efficient operation. They provide precise maneuvering with a minimum of effort.

**Finger-tip hydraulic booster steering** on the HD-15 and HD-20 requires only 3 to 5 lb. pressure on the controls. And to make brake-clutch coordination especially easy, brakes are self-energizing. They require less pedal pressure and take hold with a firm, uniform grip.

**Easy-working side boom levers** are spaced to give ample hand room. Extendable counterweights operate through finger-tip hydraulic controls. Internal expanding brakes are completely enclosed from dirt and moisture — safe and dependable regardless of weather conditions.

**Built-in torque converter** drive on the HD-20 eliminates most shifting . . . frees the operator's hands for side boom work. Also, with torque converter drive there's no problem in matching tractor speed to cleaning-priming or doping-wrapping machines — even on steep hillsides. Operator merely advances or retards throttle.

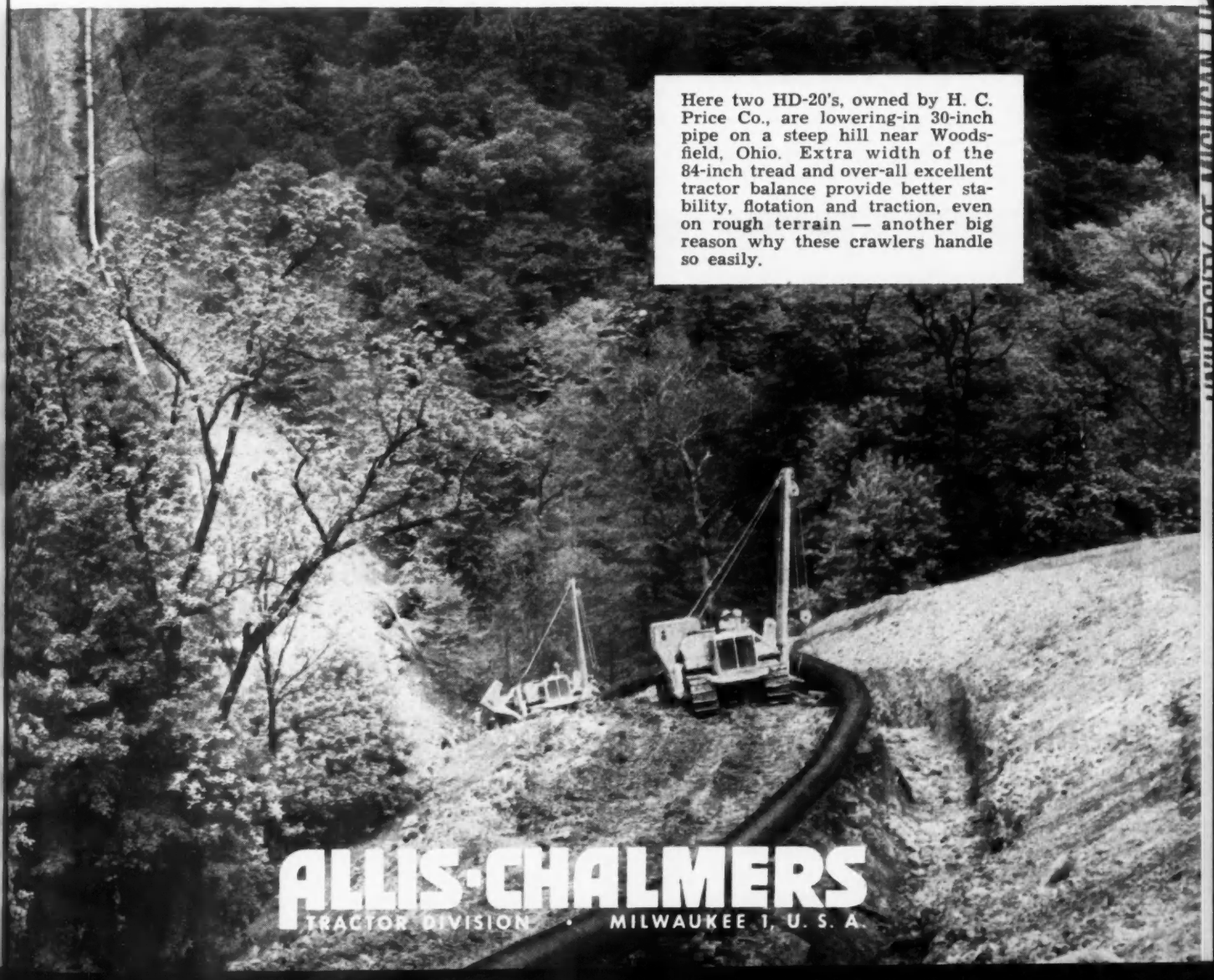
**Add to these advantages** roomy, adjustable cushion seats, wide arm rests, electric starting and it's easy to see why an operator does more with less effort when he's behind the controls of an Allis-Chalmers tractor. Let your dealer prove it with a demonstration.

**HD-15**

Boom Tractor with standard counterweights — 50,050 lb.
Bare Tractor — 27,500 lb.
102 drawbar hp.

**HD-20**

Hydraulic torque converter drive
Boom Tractor with standard counterweights — 71,650 lb.
Bare Tractor — 41,000 lb.
175 net engine hp.



Here two HD-20's, owned by H. C. Price Co., are lowering-in 30-inch pipe on a steep hill near Woodsfield, Ohio. Extra width of the 84-inch tread and over-all excellent tractor balance provide better stability, flotation and traction, even on rough terrain — another big reason why these crawlers handle so easily.

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

# How to do it

# PIPE LINE HINTS

**$10 is paid for each illustrated acceptable contribution. Mail to The Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas.**

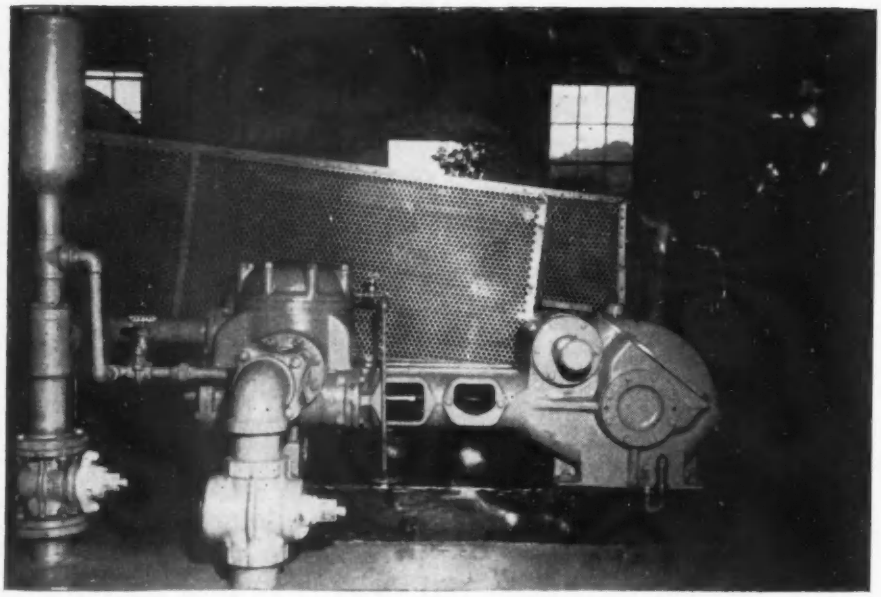
## Mounting Hot-Pass Trailer on Tracks

A hot-pass welding trailer which has two large sun shades, tool boxes and water kegs and what-not is mounted on tracks to make it more suitable for rugged terrain.

The sun shades are spaced 40 feet apart—one mounted on the tow tractor, the other on the trailer, so that two pairs of hot-pass welders can work together. The two diamond plate tool boxes at the end of the trailer provide plenty of storage space for tools and welding rod.

Mounting the trailer on tracks saves maintenance in rugged terrain.

The contractor has a similar trailer for stringer-bead welders which has space for three welding machines and a single sun shade.



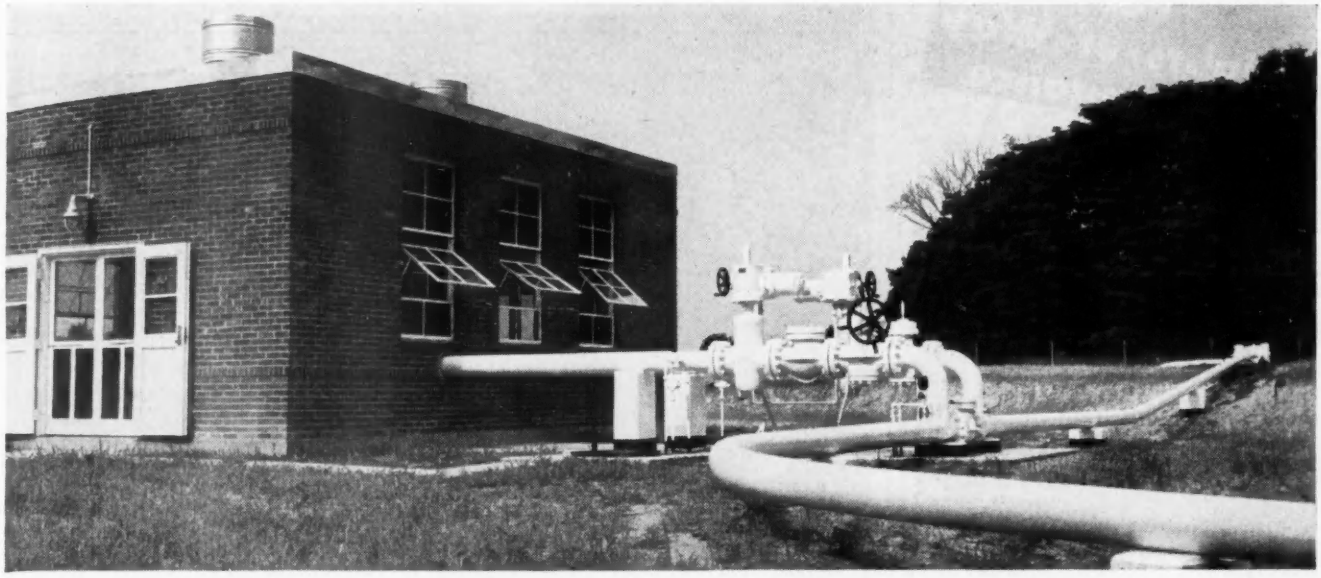
## Draining Liquid from Surge Chamber

Where it is necessary to have a surge chamber on the discharge of a pump to prevent pounding, a simple connection will always insure that the surge chamber is full of gas instead of liquid. It consists of placing the bypass connection directly under the surge chamber in such a way that the liquid is drained from the surge chamber whenever the bypass is opened.

Whenever the pump is shut down, the inlet and discharge valves are closed and the bypass opened. The bypass line is large enough and is connected with a slight drop towards the inlet and the liquids will flow by gravity from the surge chamber and allow any gas that may be trapped in the suction side to pass up to the top of the surge chamber. This puts the gas where it belongs and removes it from the suction where it would prevent the pump from kicking off.

## Closing Gate Valves

Plenty of leverage in opening and closing gate valves can be obtained by using the handy gadget illustrated. The handle is a 40-inch length of 1¼-inch pipe. A short section of round bar is welded into the end of the handle and bent into a "U." Two ¾-inch bolts are welded to the sides of the handle. Hook the cheater to the handle of the gate valve and turn it easily.



# This Illinois pumping station is controlled by a man in Radio City

When dialed, the pumping station automatically sends its meter readings via teletypewriter to dispatcher in New York.

Shell Oil Company's automatic pipeline pumping station in Dennison, Ill., is supervised and controlled over Bell System lines from an ordinary telephone dial in New York City—more than 800 miles distant!

For meter readings, Shell's dispatcher in New York's Radio City dials a number. Back on the teletypewriter from the Dennison station come suction and discharge pressures and motor current readings.

He dials other numbers to start or stop the pump, open or close valves or to summon an attendant.

This remote-control system keeps the pipeline—which carries 22 different finished petroleum products—operating smoothly from one central location. Dennison is only one of four similarly controlled pumping stations on the line.

Using Bell System communications, you get the benefit of new developments without tieing up capital.

Whether you need private-line telephone, mobile telephone, or teletypewriter service, or channels for remote metering and supervisory control, you'll find research and experience of the Bell System give you the best services available.

**Your Bell Telephone Company will be glad to study your communications problems and needs without charge.**

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TELETYPEWRITER

MOBILE TELEPHONE

METERING CHANNELS

BELL TELEPHONE SYSTEM

**For Rights-of-Way Maintenance**

Why spend money hand-grubbing oil and gas line rights-of-way when you can do the job better, cheaper, quicker with a Caldwell S-2 Rotary Brush Cutter? The S-2's 57-inch reversible Spring Steel Blade will cut brush to two inches thick, and better, and will do it in a once-over. Users include Transcontinental, Texas Illinois Transmission, Tennessee Transmissions, others. We'll give you a demonstration. Write Dept. W.

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## Diverting Troublesome Stream

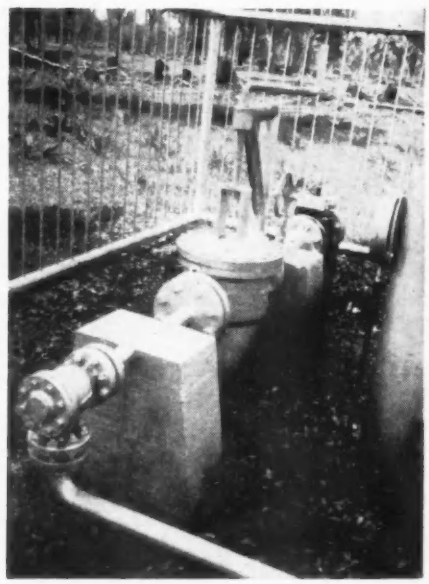
Pipeliners made short work of diverting the small stream pictured with a bulldozer and a joint of line pipe. The stream crossed the ditch line at right angles where shallow sub surface rock required drilling and blasting.

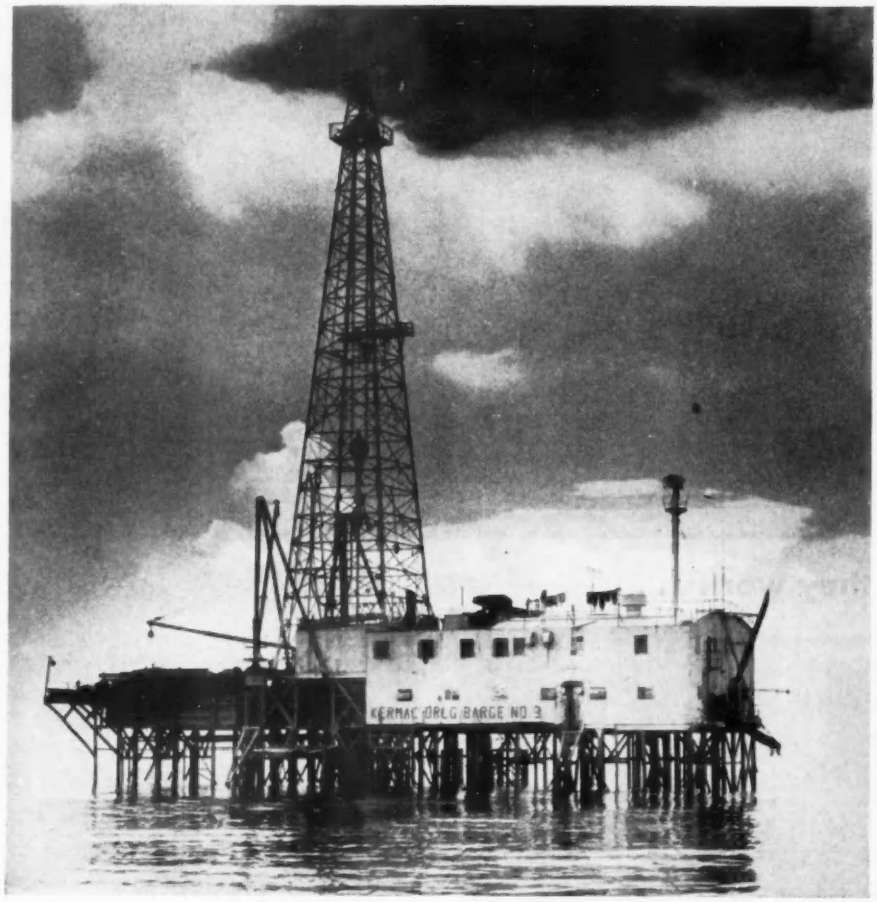
The pipeliners backed the stream up with a few passes of a bulldozer and then channeled it through a joint of line pipe. Once ditching was complete and the pipe had been laid, the pipe was removed and the stream resumed its normal course.

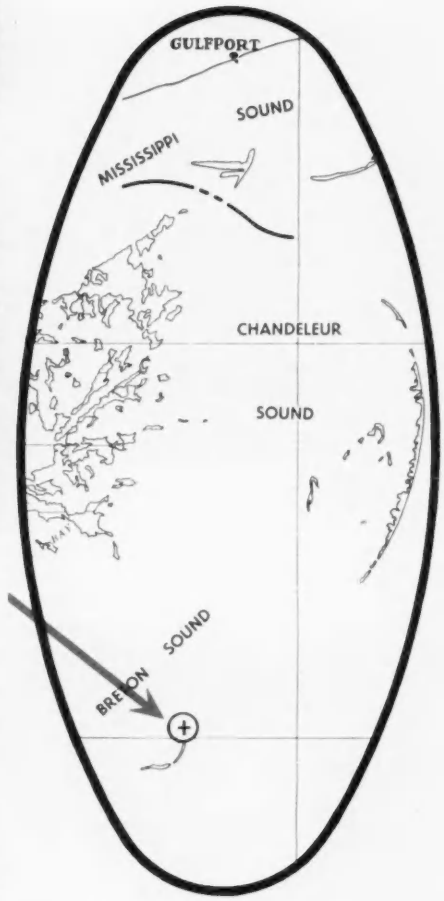
## Lifting Strainer

Take the effort out of cleaning strainers by providing a crank to lift the lid and a pivot to swing it out of the way. It's easy to make and fits right on the strainer itself.

Weld a bracket to the strainer lid and tack a hex nut on the underside. Then bend the bolt that fits the nut into the shape of a crank and run it through the bearing of the pivot. The latter consists simply of a rigid frame made of 1½-inch pipe screwed into a coupling welded to the pipe. The threaded end of the pipe should turn freely allowing the operator to swing the lid free of the strainer.






**"... the ugly and beautiful Rig 40..."**

# The Air-Conditioned Roughnecks Of Breton Sound

**These are the men of Kerr-McGee's Rig 40, where the coffee is dark, the steaks are plentiful, and the bit's in a monstrous hurry.**

**By AL REESE,** WORLD OIL Staff

It was in Houston and Jim Savage, Gulf Coast representative for Kerr-McGee Oil Industries, Inc., was saying: "It's got air conditioning and television."

It was in Morgan City, La., and Bill Baxter, superintendent, and Demp Womack, assistant superintendent, Gulf Coast Division, were saying: "It'll submerge in 24 feet of water and drill a hole so fast you won't believe it."

It was in Gulfport, Miss., and Johnny Burgess, district clerk, was saying: "When you see this barge you can quit looking. You will have seen all there is to see."

It was three hours out of port, and Relief Captain Riley Bourque was saying as he pointed through the forward window of the Kermac II to where a far derrick lifted a misty finger against the muddy sky: "There's that toolpushin' son of a son!"

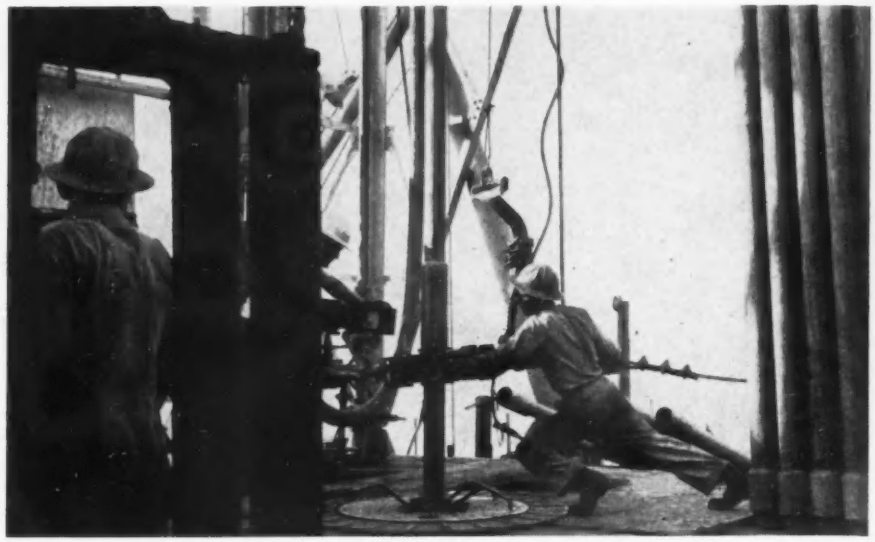
It was on the barge, 70 miles down the coast and eight miles north of Breton Island, and Toolpusher Johnny Rainwater was saying: "When you stick a joint of pipe in this son of a son you better grab the brake real quick or the kelly-cock will drop right through the blowout preventer."

Rig 40 is faintly remindful of a startled crane—thin-necked, skinny-legged, pot-bellied—as it scuttles about the floor of Breton Sound, pecking holes with startling rapidity. It is almost routine for one tour to spud in and the next to reach TD at 3250. It drilled 134,000 feet of strata hole in three recent months. In just three days it can flood its pontoons and sink to position; drill 230 feet and set 10¾-inch; cement, sample and test; drill to 3250; run electric log; plug.

Here is $1½ million worth of structural ugliness and technical beauty, of clanging and whining and furiously digging equipment of surpassing efficiency. And here, also, is something else. Here is a crew that sticks iron in the ground as if they were probing for the devil.

Experience has a hand in it, of course. But of the two crews that went on tour on one recent day, each was filling in with a deckhand, and one of the roughnecks was without previous experience when he wrote Rainwater for a job not long ago: "I am very

# this is life on Rig 40 . . .



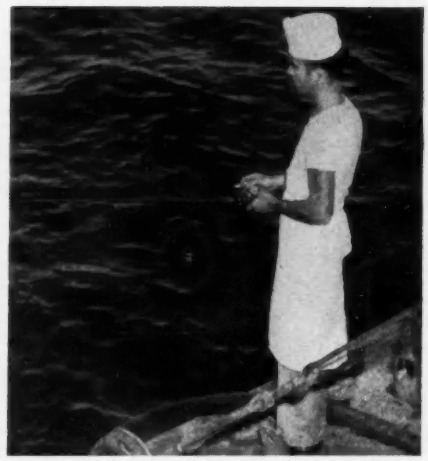
they work . . .

. . . and drink coffee . . .

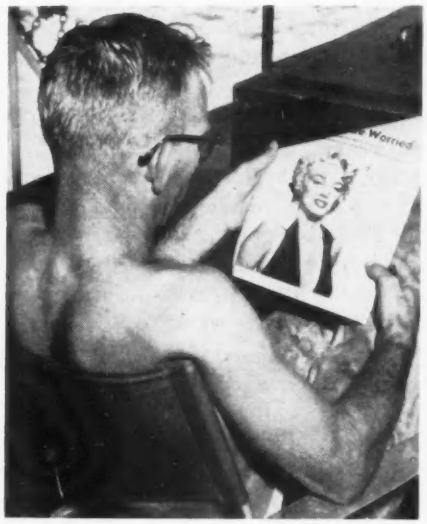
. . . and shower . . .

. . . and eat . . .

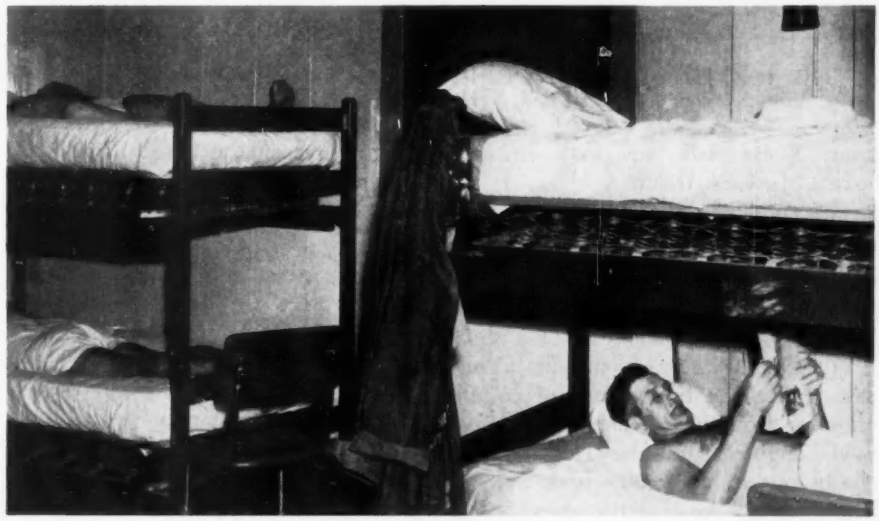
. . . they watch television . . .



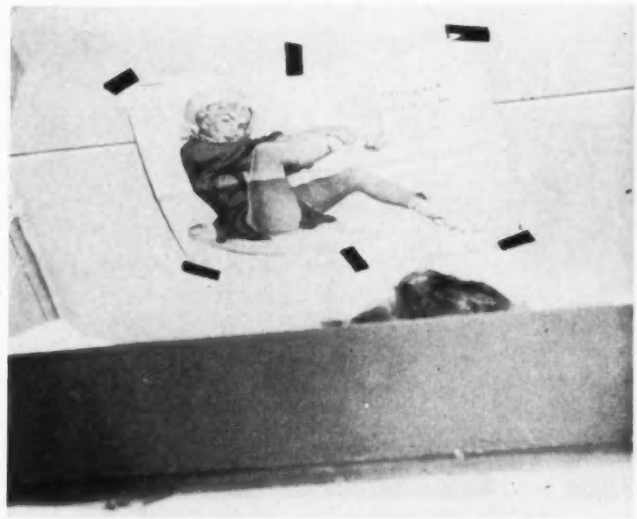
. . . and fish . . .



. . . and read . . .

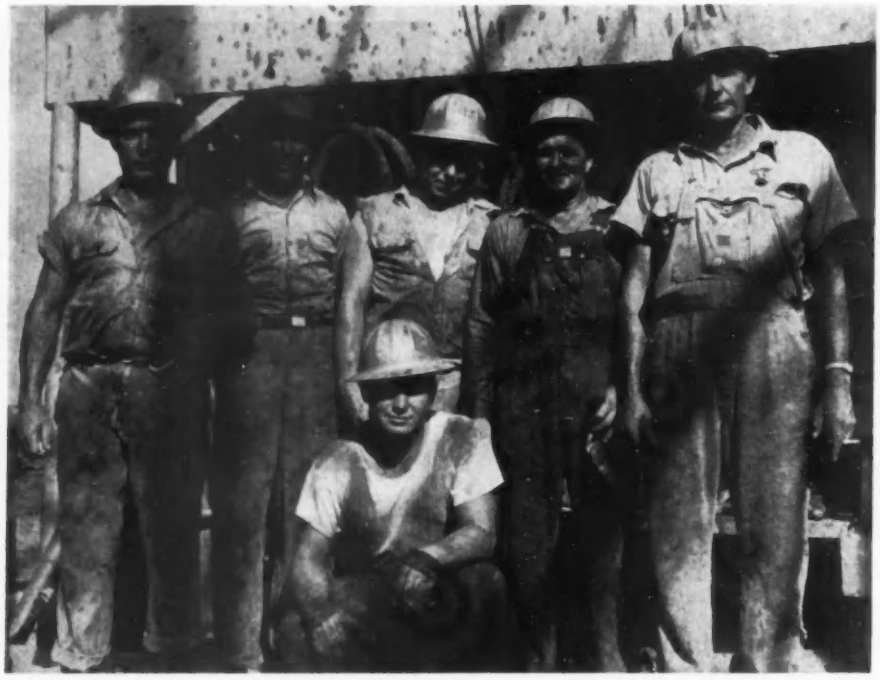


. . . and sleep . . .



. . . perchance to dream

**CHOW TIME.** Far left: Pruitt (head of table) and his Texas crew come off tour. In his bunch were B. R. Crawford, L. H. Ivey, E. T. Landry, C. E. Rayborn and R. W. Piercy.



**ON THE JOB.** This is Driller Jack Corley's Louisiana crew. From the left are Archie Kelso, Willis Ronsonet, J. C. Liddell, J. H. Sandoz, and Corley. Kneeling is J. L. Urie.

stout. I can lick any man in the county. Just ask them."

This typically fierce pride in self has been fused with a wise company policy into superb morale.

Here is why the bit goes down so fast on Rig 40:

Put coffee high on the list. You first realize the importance of coffee an hour from land when Toad Wisdom, engineer on the Kermac II, climbs out of the galley with a look in his eye like an obstetrician who has just delivered quintuplets. "Fresh pot's ready."

**Choose Your Coffee.** Before you're five minutes on the barge First Cook Milton Touchet has to know: "You want Louisiana coffee or that other stuff?"

"That other stuff" is also called "Texas coffee" or "light coffee" to differentiate it from the Louisiana "dark coffee." On Rig 40, there are two kinds of men and two kinds of coffee. Men or coffee born or made in Louisiana are so identified. Men or coffee born or made in any other place are "Texas." Thus, Rig 40 has one Texas crew and one Louisiana crew at work and one of each ashore, although when you dig into it you find that one of Driller Bill Pruitt's Texas bunch is from Arkansas. "He's almost from Texas," said Pruitt, and there seemed to be a trace of apology in his voice. "He's from just over the line, near Texarkana."

On Rig 40 they believe that a man shouldn't have to reach any farther for a cup of coffee than he does to scratch the seat of his britches. There's a two-gallon urn of each kind a few steps from the rotary table. Each urn is filled four times daily, which adds up to 16 gallons of coffee served each day to 25 to 30 men—not counting what is drunk at the four meals during a 24-hour period.

These shining pots are the focal point of life on Rig 40. Here is a gossipy respite in the lunging, sweating turmoil of a long, long 12-hour tour. Here is a companionable island hung between the silent stars and the gloomy sea. Here is balm for tired muscles and comfort for lonely spirits.

Also right at the top in importance are the working hours. Drillers and roughnecks work a week and are ashore a week. R. W. Piercy, 20-year-old, recently married roughneck on Bill Pruitt's crew, decided there could be no more satisfactory distribution of his time. "Man, I have me a honeymoon every other week."

The toolpushers also work a week on and a week off, but while the drillers and roughnecks are absolutely free when they step ashore, 'Pushers Rainwater and H. A. Broughton alternate as nipple chasers—that is, the one ashore must stand by his home phone or auto radio to act on calls for needed equipment.

Interlocked with working hours as

**THE TOOLPUSHER'S DAY** is never done on Rig 40. J. D. Rainwater drops into the galley at midnight to have a look at the meal being prepared by Second Cook Cero Piediscalzi, and dawn finds him at the radio, ordering supplies. A typical order might include toilet bowl plungers, dark coffee, drill bits.

# There's one fine way to discover the "plus-values" in Lane-Wells Koneshot ...try it!

When you use KONESHOT, you'll see for yourself *why* it's better.

Your first conversation with your Lane-Wells field man will give you confidence in his *experience.* When the crew arrives at your rig, watch the quick, sure, time-saving operations which tell of *thorough training.* Notice the *safety-engineered* precautions which protect your well and your crews. Take special note of how Lane-Wells *accurate depth measurements* put that deep penetration right where you've ordered it.

Then, we believe, you'll agree with the many other careful operators who call Lane-Wells

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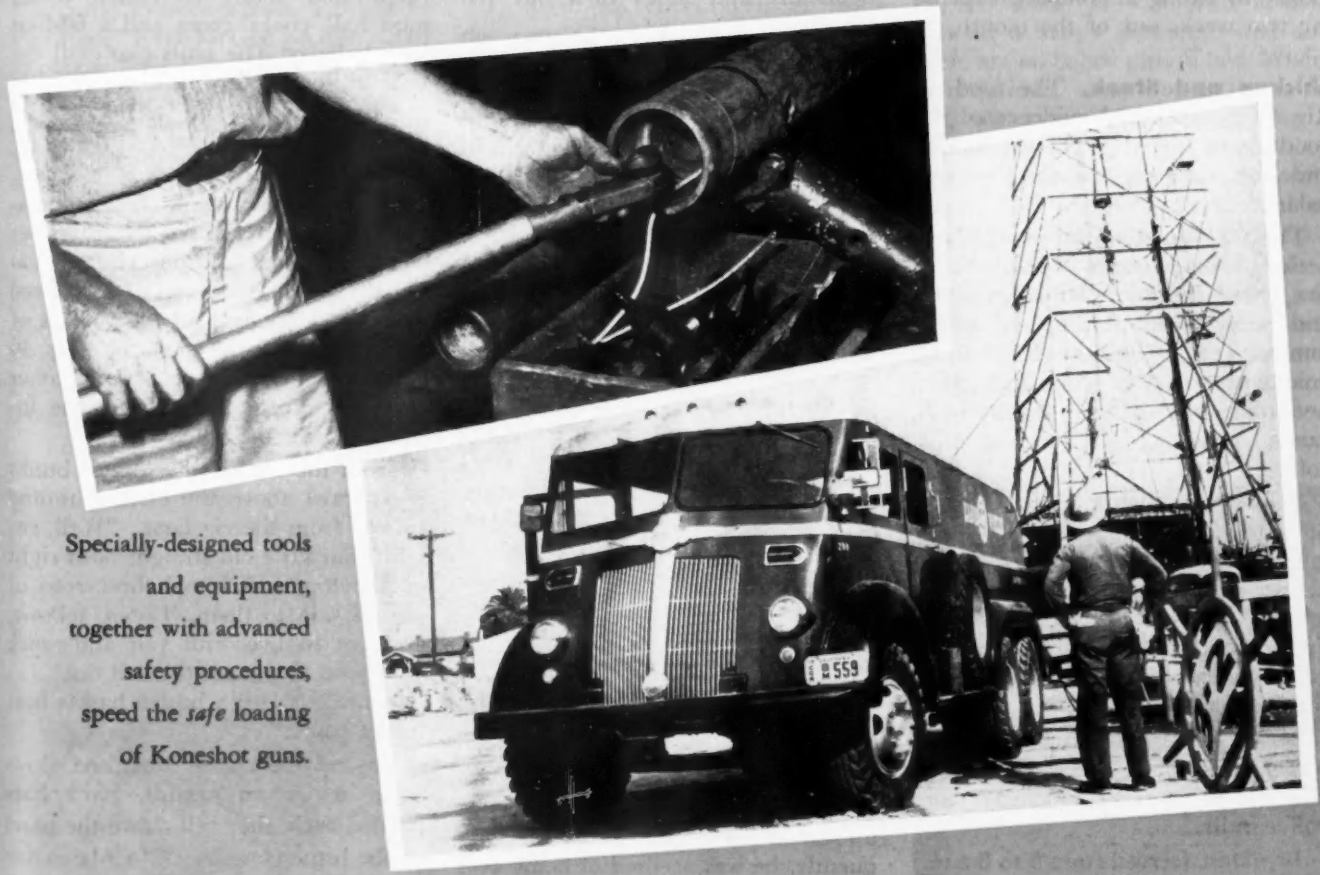
the "plus-value" shaped-charge perforating



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## Behind The Men Behind The Bit . . .

**EACH TURN OF THE BIT** is the result of a coordinated effort centering in Oklahoma City. Rig 40 is a unit of the Gulf Coast Division with headquarters at Morgan City, where its achievements are being discussed (left) by W. C. (Jim) Savage, Gulf Coast representative and goodwill ambassador-at-large; W. C. (Demp) Womack, assistant division superintendent; and Jerry Rudolph, division clerk. Rig 40's home base (right) is at Gulfport, Miss., where Dispatcher John M. Burgess keeps supplies moving.

a morale factor are wages and food. Because of a little better pay scale, and allowing for boat time—3½ hours each way—a roughneck on Rig 40 can make almost as much in one week as he could in twice the time ashore. Then, of course, he saves a lot of money by eating at company expense for two weeks out of the month.

**Chicken and Steak.** The food on Rig 40 is additional evidence of the goodness of life when things "Texas" and Louisiana are brought into nice balance.

This was the menu for one 24-hour period: Noon lunch—Steak, boiled rice, rice dressing, mashed potatoes and gravy, string beans, red beans, tomato and asparagus salad, sliced onions, a variety of jams and jellies, hot rolls, cornbread, light bread, canned peaches, cake, limeade, milk, coffee.

Supper (served from 6 to 8 p.m.)—Steak, roast chicken, rice, rice dressing, red beans, string beans, sauerkraut, mashed potatoes and gravy, lettuce and tomato salad, asparagus tips, cranberry sauce, rolls, bread, a variety of jams and jellies, cake, milk, limeade, coffee.

Midnight lunch—Fruit juice, dry cereal, steak, ham, bacon, eggs as you like them, jams and jellies, toast, coffee, milk.

Breakfast (served from 5 to 8 a.m.)—Same as midnight lunch, omitting the steak.

All hands are privileged to sit down to all four meals, but as it works out each crew passes up one in favor of more sleep.

The kitchen is always a bustling place as Chief Cook Touchet and the mess boys prepare the breakfast and noon meals, and Second Cook Cero Piediscalzi and aides turn out the other two.

The cost to Kerr-McGee of distributing what Toolpusher Rainwater calls "That Kermac spread" was about $75 per day for a recent typical month. This is exceeded on more remote Kermac rigs where transportation is costlier. During the same month it cost about $100 per day to feed the crew on a rig at Golden Meadows, Louisiana, according to the ledger in the office of Jerry Rudolph, division clerk at Morgan City.

Rudolph believes it economical to let the men have exactly the food they want. "Give them things they won't eat and you make them unhappy, which costs money indirectly, and you pile up a lot of waste besides."

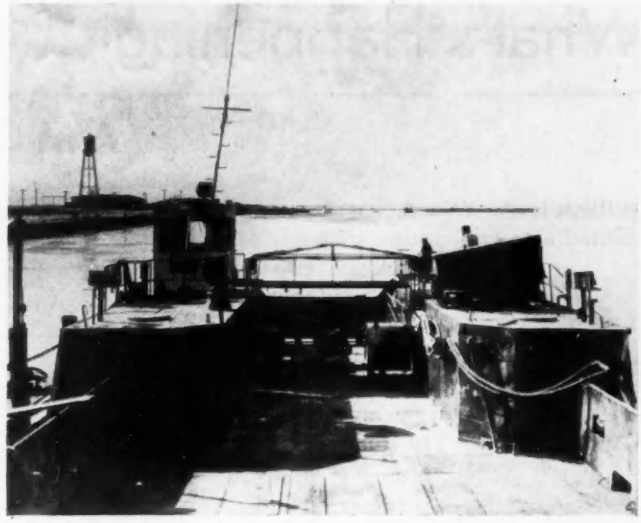
One of the most ardent sympathizers with the prodigious appetites aboard Rig 40 is Assistant Superintendent Womack, who himself enjoys a formidable reputation as a consumer of calories. Womack once whomped up a cunning contrivance with which he could make five gallons of ice cream when the anchor was winched up on a Kerr-McGee YF. Consequently, he was accused of being ever impatient to complete a hole and get moving.

Most unusual evidence of Kerr-McGee's interest in the comfort of the men on Rig 40 is the air-conditioning system. Two refrigerating units which together are equivalent to a 16-ton unit are alternately worked 24 hours to cool the two crew rooms, visitors' rooms, toolpushers' room, radio-radar room, recreation room, mess hall, cooks' room and a 60-foot long hallway. The units also chill the walk-in locker for meats and other perishable foods and turn out 100 pounds of ice at a time for the cooks' use.

A well-frequented spot is the recreation room, where the television set works a virtual 24-hour shift, occasionally in competition with a tired game of dominoes. After 12 hours of wrestling iron, the men of Rig 40 have little inclination for any other diversion except reading and the inevitable bull throwing.

From the cool dark of their bunks they drawl above the distant, muted clamor from the rig floor: "Well, sir, I hit that little old straight flush right on the top, and I told those sons of sons, I said to them, 'Listen, fellows, I've got to live with you and work with you. Please get the hell out.' . . . Did you ever see a bushel basket half full of pesos?"

Around the coffee urns, one glove stuck under an armpit, hard hats pushed back, they yell above the snarl of the brute close by: "No Alaska for me. I'm gonna stay right here and watch ol' Bill work me down to a splinter. That guy makes us pull more



**SERVICING THE DRILLING BARGE** are three 63-foot crash boats (left), an LCT (right), and a tug. The crash boats are war surplus air-sea rescue craft whose two 165-horsepower diesels can turn up 20 miles per hour. The LCT, 107 feet long and with three 165-horsepower engines, hauls pipe and other heavy equipment. The leased tug, of 900 horsepower, pulls Rig 40 to new locations.

pipe than was in the hole in the first place."

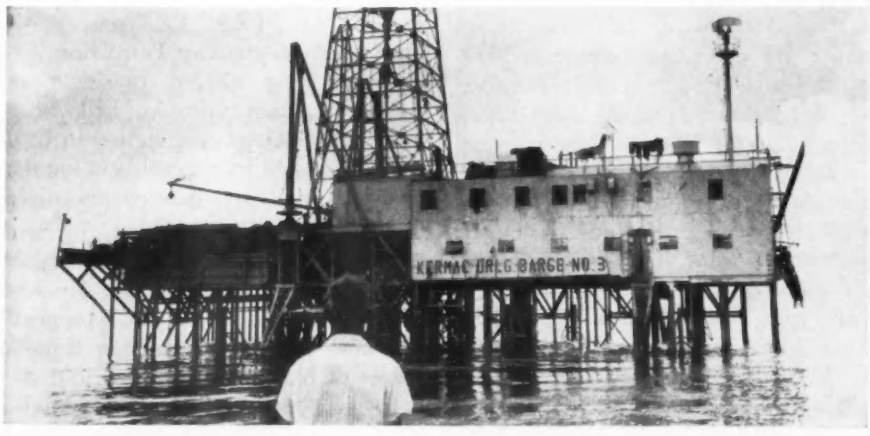
**Crew Pride.** There is one rung in the ladder of morale that costs Kerr-McGee nothing. This is crew pride, spawned in geography. Heeding the ancient argument of drillers that "If I'm going to work a man, I ought to hire him," Kerr-McGee permits them to choose their own crews. Thus, they employ men from their own neighborhood—first, because they know and trust them; and second, because if all the crew resides in the same locality they can travel in one car, cutting expenses considerably.

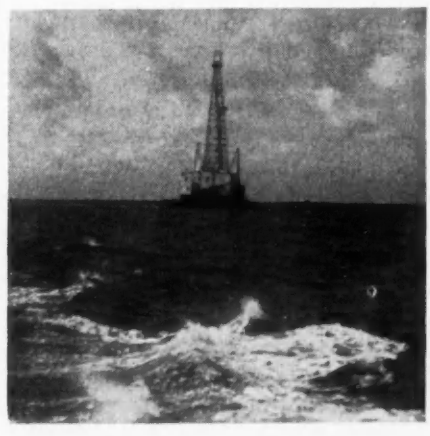
This common background helps make life more amicable on the barge, where they live almost within arm's length of each other at work, eating and sleeping, 24 hours a day, seven days at a stretch. No man could remain lukewarm to another in such circumstances. Such a constant rubbing of personalities must produce the warmth of friendship or the friction of hate, and the latter would be promptly slapped down by Drillers Jack Corley and Pruitt, the paternal leaders of the crews.

It needs no encouragement from the company to produce in such groups a competitive pride in a job done well and swiftly. By the same token, it needs a pusher only half as wise as Johnny Rainwater to know that you handle such men with a light touch. On a recent day when Rig 40 was waiting on orders and Rainwater was gulping dark coffee and fretting at the inactivity, he made this grinning remark: "If I don't watch myself I'll start riding one of those roughnecks and get myself thrown in the ocean."

Here, then, is Rig 40, haven from a perfume-and-nylon civilization, where a man can stretch his muscles and his vocabulary simultaneously with never a look over his shoulder. Where he can gulp his good red beans with a knife, belch without restraint, and blow his nose through thumb and finger. Where he can slam a door without a baby's answering wail and there are no bobby pins in bed. Where there are no auto horns, no neckties, no grocery bills, and no man is "Mister."

All this for a week. Then, blessedly weary, and hungry in places where food can't reach, the air-conditioned roughneck of Breton Sound boards a Kermac crash boat and heads impatiently homeward, while behind him the horizon swallows the ugly and beautiful Rig 40, that toolpushin' son of a son. **—The End**



**ONE LAST LOOK,** and he heads impatiently homeward, while behind him the horizon swallows Rig 40, that toolpushin' son of a son.

# What's Happening

## AMONG WORLD OIL MEN

ROBERT B. WING has been appointed area exploration manager for Shell Oil Company, with headquarters at Calgary, Alberta. He succeeds H. Koch, who has been transferred to the Los Angeles area.

Robert B. Wing

Wing is a native of Ipswich, S. D., and was educated at Minnesota University, where he received his A.B. degree, and at Washington University, where he received his M.S. degree in geology in 1932. He joined Shell in 1934 as field geologist at the Tulsa, Okla., office.

Wing rejoined Shell as an area geologist after serving in the army during World War II. In 1952 he was named division exploration manager at Casper, Wyo., which position he held until his recent appointment.

•

ROGER H. DESAINT, chief mining state engineer who for the past seven years has assisted the Bureau de Recherches de Petrole in the organization of French state oil activities, has joined Compagnie Generale de Geophysique, which operates in Italy, Sicily, Tunisia, and elsewhere.

•

WILLIAM C. KIRKPATRICK has been elected a director of International Petroleum Company, Ltd. A native of Sarnia, Ontario, Kirkpatrick has been with International since 1924. He served in Colombia, commencing in 1928 as an accountant principally in producing and marketing activities. In 1939 he was transferred to Calgary, Alberta, as chief accountant for the producing and exploration activities of Imperial Oil, Ltd. He returned to International's Toronto office in 1945 as assistant treasurer and was appointed treasurer in 1949.

Last year Kirkpatrick was assigned to Colombia as general manager of Andian National Corporation, Ltd., International's pipe line affiliate. He returned to International's executive offices in Coral Gables, Florida, early this year.

**BELGIAN AWARD**—Baron Silvercruys (right), Belgian ambassador to the U. S., recently presented Frank W. Abrams, chairman of the board of Standard Oil Company (N. J.), with the Cross of Officer, Order of Leopold, conferred by His Majesty, Baudoin, King of Belgium, for "Service to the best interests of our two nations." Baron Silvercruys said the award serves as a "vivid example" of the close ties between the American and Belgian people. In accepting the award, Abrams said the honor should be shared by his entire company—its employes and shareholders.

EARL S. NEAL, general manager of producing department of Imperial Oil Limited, has been elected a director of the company. A graduate of the College of Mining of the University of California, Neal was formerly chief geologist for Lago Petroleum Corporation in Venezuela. Subsequently, he was in charge of world wide petroleum reserve studies and head of the producing economics section of Standard Oil Company (N. J.).

•

C. A. L. HOGG, deputy minister of natural resources, has been appointed deputy minister of mineral resources for Saskatchewan. Hogg joined the Department of Natural Resources as a geologist in 1944. He was appointed assistant deputy minister in February, 1946, and was promoted to deputy minister the following October. Hogg is a director for Saskatchewan Minerals and Saskatchewan Research Council, his province's representative on the Interstate Oil Compact Commission, and is a member of the American Association of Petroleum Geologists.

WALTER K. LINK, who has been named exploration adviser of International Petroleum Company, Ltd., has spent his more than 27 years in the oil industry on exploration activities in North and South America and in the Far East.

Walter K. Link

His first assignment with the Standard Oil Company (N. J.) organization was as a junior geologist with Standard Oil Company of Venezuela in 1925. Two years later, he became a field geologist with International in Colombia and from that position was transferred to the Far East. He returned to the U. S. in 1935 as a divisional surface geologist with Carter Oil Company, and in 1937 was appointed exploration manager and chief geologist for Esso Standard Oil Company, Louisiana division.

Link was named exploration manager and chief geologist for North America, Central America and the West Indies with the parent company in 1941, and four years later was exploration manager and coordinator for Colombia, Ecuador and Peru with International. He returned to the parent company in 1947 as chief geologist in the exploration section, a position he held until his new appointment with International.

•

J. GRANT SPRATT, a past president of the Canadian Petroleum Association, was elected president of Anglo-Canadian Oil Co. Ltd. at a meeting of company directors in Calgary. H. R. Milner, president for the past 15 years, was named chairman of the board.

Spratt is a graduate in geology of the University of Manitoba. He was engaged in geological and engineering work for the oil and gas departments of both the Canadian and Alberta governments. Joining Anglo-Canadian in 1938, he has been vice-president and managing director.

# New Canadian Map Shows Trail's End

**Alberta government's aerial photographic survey of province a boon to oil companies.**

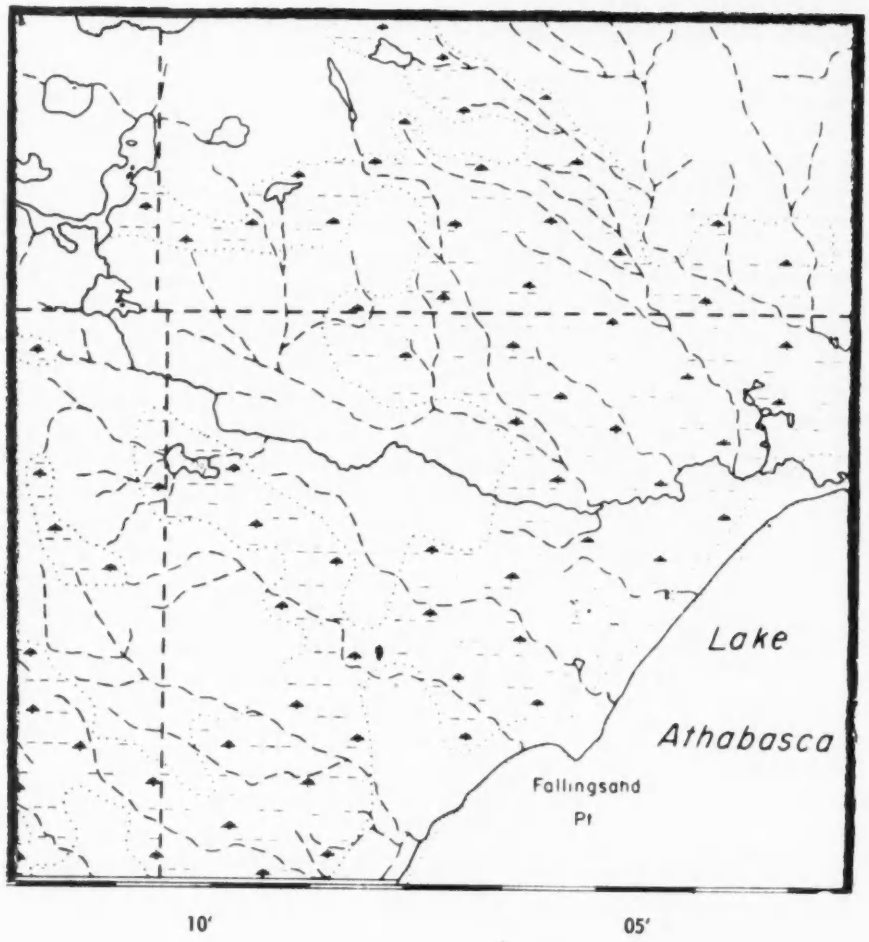
**By BOB SHIELS,** Oil Editor, Edmonton Journal, Edmonton, Alta.

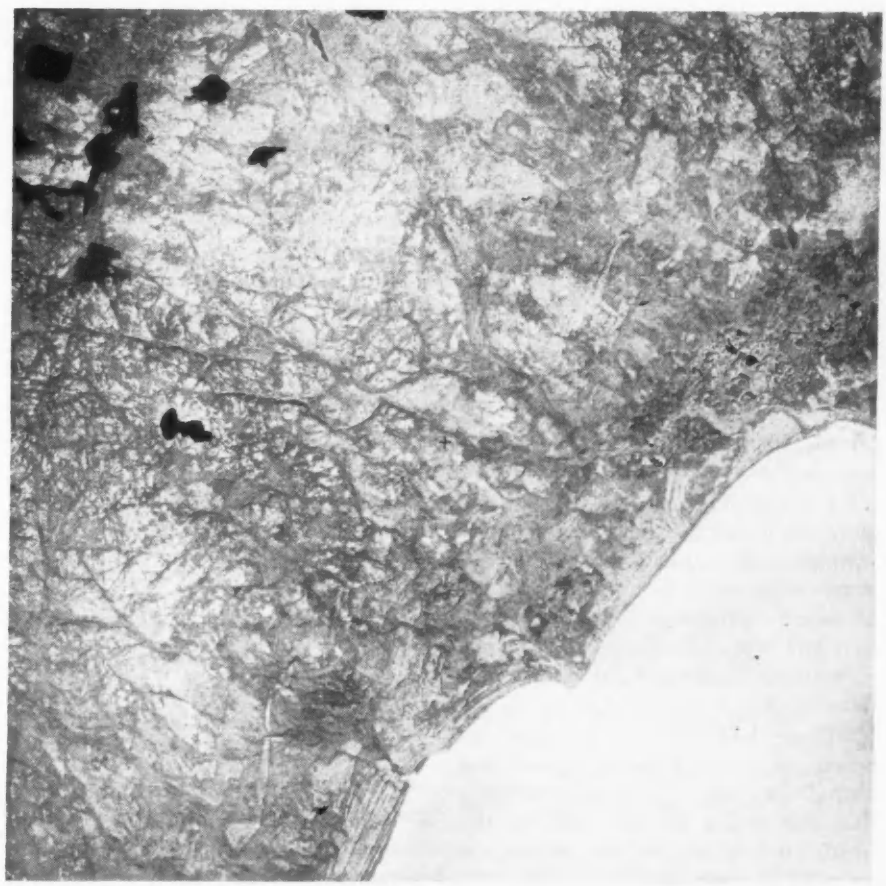
THE PROVINCE OF ALBERTA, Canada, sprawls over a greater area than any state in the U. S., except Texas. In 1949 the Alberta government undertook an aerial photographic survey of that great area—255,285 square miles—and prepared to draw up planimetric maps where adequate mapping was not available. The job will be completed this year.

Because considerable portions of the province are spotted with swamp-like muskeg and lakes, with a multitude of previously-uncharted rivers and streams of every size, the aerial survey of the land lying within Alberta's boundaries has proved a boon to oil companies operating in the north.

The province-wide survey resulted from an agreement the Alberta government entered into with commercial photographic interests in Toronto. Purpose of the survey was to obtain maps from aerial photographs showing geophysical features of the province, particularly in unsurveyed and uncharted areas of the north.

The over-all survey was flown to the scale of 3333 feet to the inch. To compile a forest inventory, portions



**SECTION OF MAP** at top of page was made from aerial photo below. Dotted enclosures show swampland.

of Alberta were photographed in the scale of 1320 feet to the inch. Cost of the project is estimated in excess of $1 million.

A spokesman for the Alberta government's Lands and Forests Department said that due to the oil boom developing after the Leduc discovery, priority was given to mapping unsurveyed and uncharted areas.

Leduc and Redwater, Alberta's earliest discoveries in the present oil boom, are situated in the general Edmonton area, and oil companies found they had no difficulty acquiring maps and information about the land. But as the boom developed to its present peak the search for oil pushed farther into the sparsely-settled northland. The need for detailed maps became increasingly urgent.

Five hundred maps had been completed by the spring of 1953, and another 100 were on the drawing boards. An area of about 200,000 square miles had been charted to the scale of one mile to the inch. Copies of these are now available.

Photographic coverage of Alberta was complete and included the cities of Edmonton and Calgary and other well-settled districts. Because maps already were available, the government did not bother drawing up charts covering certain urban areas. Completion of the remaining 100 maps now being compiled would complete the mapping of the whole of the province.

**What's Shown.** Shown by the maps are: Provincial highways, main roads, secondary roads, trails, railways, township lines, section and quarter-section lines, forest reserves, transmission lines, telephone and telegraph lines, oil and gas pipe lines, rivers, lakes, sand, mud, swamp, forestry cabins, lookout towers, saw mills, churches, schools and farm buildings.

Of particular concern to oil exploration crews are the rivers, streams, swamps and muskeg. As a government spokesman pointed out, "exploration companies can see what they are up against and what kind of equipment they should take into those areas.

"There has been an unusual demand for both photographs and maps," he said. "This is something that has really hit the nail on the head, particularly as far as the oil industry is concerned."

Pointing up the importance of accurate maps to exploration outfits is the fact that horses and equipment such as tractors have been known to disappear in the soft, treacherous muskeg in the Canadian north.

"We have standing orders from most oil companies operating in Alberta to forward copies of the maps as they become available," the lands and forests official continued. "They want the whole issue. For the oil industry this thing has been a godsend."

The photographs and maps serve a joint purpose. The oil man can look at the photograph and determine the lay of the land." Then he can pick out the exact location he wants by plotting it on the accompanying map.

The Alberta Lands and Forests Department "modestly boasts" that as far as detailed maps and photographs of Alberta are concerned, Alberta is in "a most enviable position" in comparison with other provinces where oil exploration in many cases still must be carried out on something of a hit or miss basis.

Alberta lands and forests personnel have received compliments on the accuracy of their maps by oil men to whom accuracy is essential. Where it is known that muskeg and swamp conditions can be expected to be encountered, exploration crews are able to bring in their heavy equipment in the winter when the terrain is frozen over.

**Where Available.** Maps and photographs can be acquired from the Technical Division, Alberta Department of Lands and Forests. "Ozalid" copies of planimetric maps, scale one inch to one mile, are available for $1 apiece. The maps cover an area 30 minutes longitude by 15 minutes latitude, or approximately 350 square miles. Photographic prints, scale 3333 feet to one inch, covering an area of about 30 square miles, sell for 80 cents a copy.

Complementing the provincial government mapping program, the dominion government makes use of the province's photographs and maps to turn out topographical maps at varying scales. These maps, too, are available from the Technical Division of the Alberta Lands and Forests Department. —**The End**

## West Germany to Build 14 Tankers During 1952-54

West Germany's shipbuilding program for the period 1952-1954 for the first time includes larger tanker projects. In his speech on the new budget, Federal Minister of Finance Schaeffer, announced that the 1952-1954 program which will be subsidized by the federal government includes 14 tankers, nine of which will be large ships of 16,500 to 26,650 dwt. and five smaller ones of 650 to 2000 dwt.

The following orders have been placed for four large size tankers: The Waried Tankschiff Rhoderei, a subsidiary of Esso Gesellschaft, ordered one 26,650 dwt. turbine tanker from Deutsche Werft, Hamburg; John T. Essberger and Ernst Russ one 18,000 dwt. motor tanker each from Deutsche Werft, and Fritzen & Sohn, and one 16,500 dwt. tanker from Nordseewerke, Emden.

It is expected that the following orders for tankers of 16,500 or 18,000 dwt. will follow shortly: one tanker each for Thomas Entz Tanker GmbH., Rondsburg, and for Tankschiff-Reederei Julius Schindler GmbH., Hamburg, with Deutsche Werft; one tanker for Deutsche Vacuum Oel AG. with the Bremer Vulkan shipyard; one tanker for Hansa Tank-Reederei GmbH. with the Stuelcken shipyard, Hamburg, and one tanker for Leth & Company with Howaldtswerke, Hamburg.

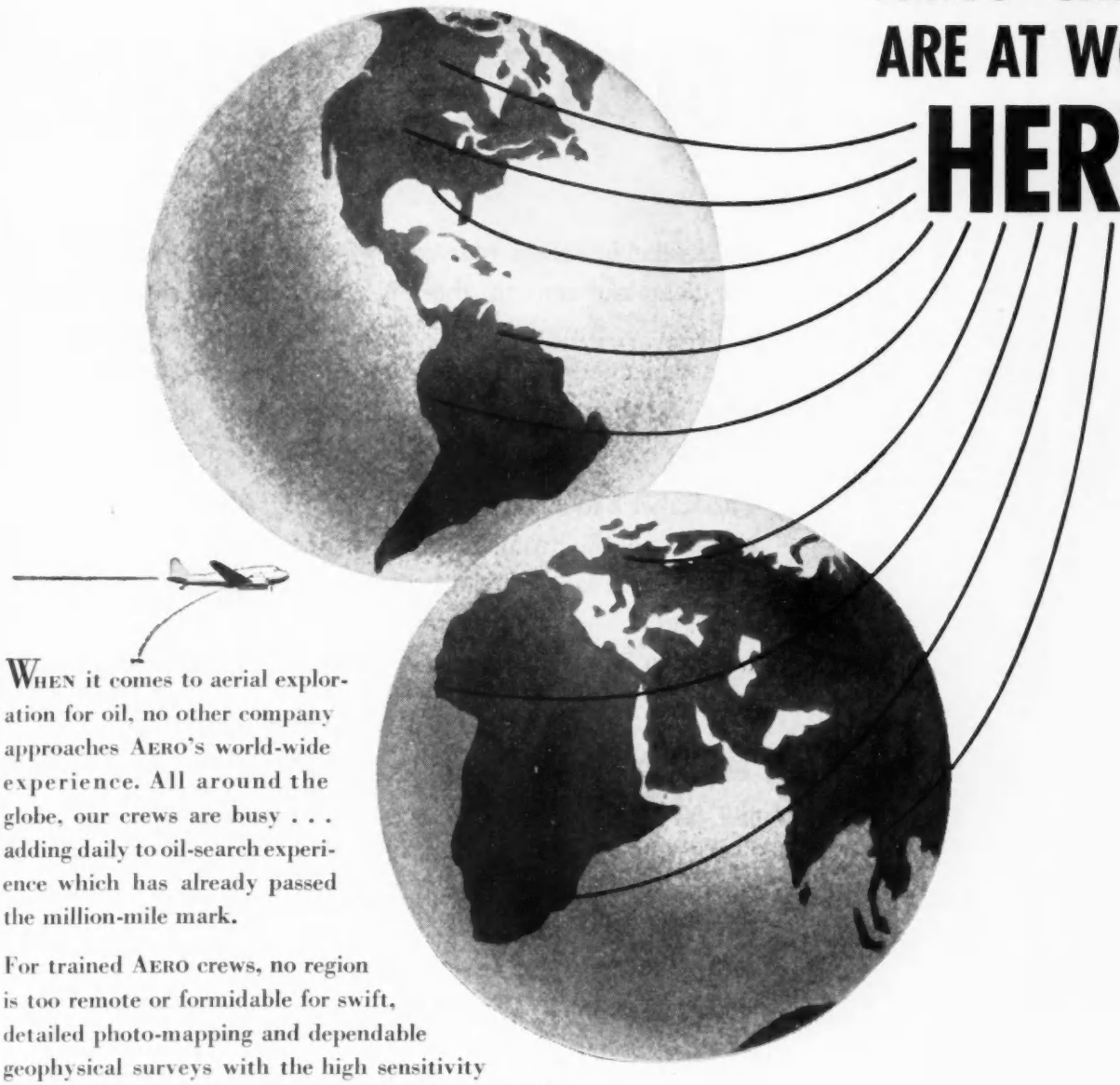
In the second half of 1952, the German tanker fleet was increased by three new tankers, "Elsa Essberger," "Anna Catharina" and "Charles E. Eckelmann." Three smaller ships were lost within the same period.

## Pakistan Petroleum Quits Well 4 at Patharia

Pakistan Petroleum Limited will abandon its well 4 at Patharia, East Pakistan, where, prior to World War II, Burmah Oil Company Limited drilled two wells. One of Burmah Oil's wells was dry, but encouraging signs were found in another.

No indications of oil were found in well 4, situated near well 3, where good indications had been found.

# AERO CREWS ARE AT WORK HERE



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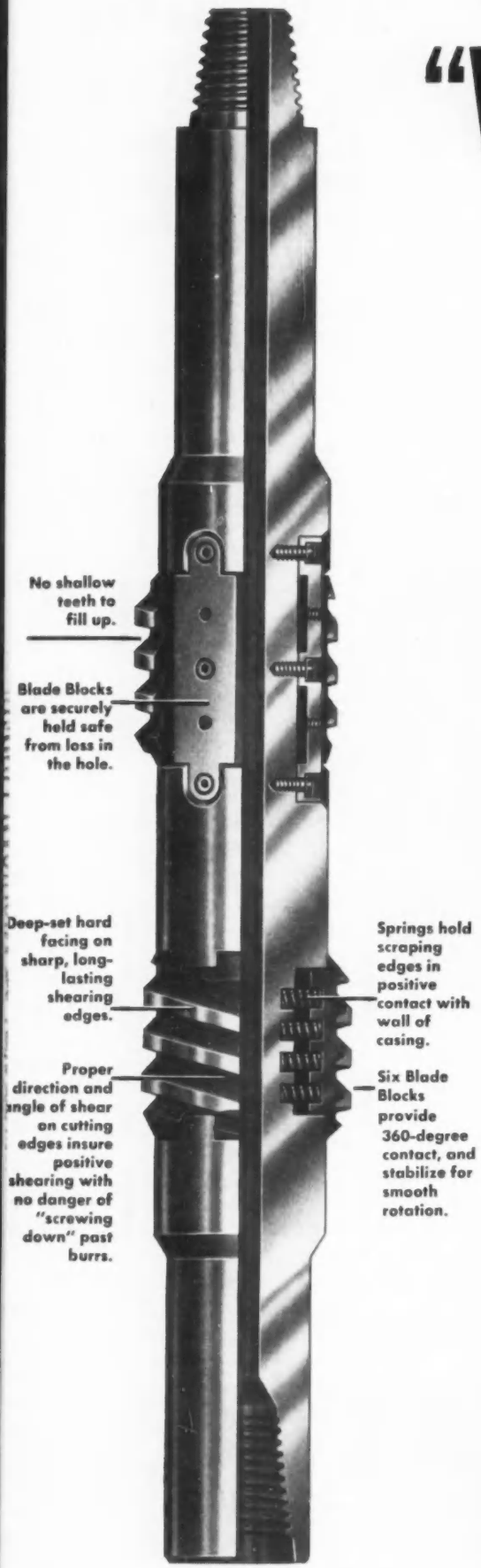
# *How is the*
# "Working Surface"


No shallow teeth to fill up.
Blade Blocks are securely held safe from loss in the hole.
Deep-set hard facing on sharp, long-lasting shearing edges.
Proper direction and angle of shear on cutting edges insure positive shearing with no danger of "screwing down" past burrs.
Springs hold scraping edges in positive contact with wall of casing.
Six Blade Blocks provide 360-degree contact, and stabilize for smooth rotation.

**Baker Model "C"**
**ROTO-VERT Casing Scraper**
**Product No. 620-C**

Unless the inside of your casing—the vital "working surface"—is clean and smooth, there is always a possibility of trouble in future operations. Burrs from gun-shot perforations, hardened cement or mud, and even mill scale are all dangerous when the time comes to run testers or swabs, or to set cement retainers or packers of any description.

The Baker Model "C" ROTO-VERT Casing Scraper removes all obstructions from the inside of the casing, leaving it clean and smooth. Burrs or imbedded bullets are sheared away; cement, mud and scale are scraped away, so that any down-hole work can be safely done at once, or during the years to come.

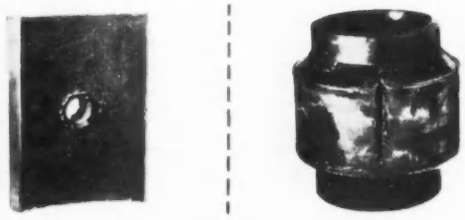
### SCRAPE WHILE DRILLING OUT

The ideal time to use the ROTO-VERT Casing Scraper is during the drilling out of cement, at which time it is run as a "follow-up" behind the bit. Thus in a single run you can also remove all hardened cement, mud, burrs and scale which might *later* damage swabs or testers, and cause packers or retainers to set prematurely—or never set at all.

### EASY TO RUN—LOW-COST RENTAL

The Baker ROTO-VERT Casing Scraper is simple to run, and will effectively clean the inside of the casing when either reciprocated or rotated.

No service man is required, and the low rental cost is paid for many times over by freedom from future damage to bailers, swab rubbers and packers, as well as by the elimination of future delays and re-running expense.



*SEE HOW THIS BURR . . .* ripped this packing element,

and how ROTO-VERT could have prevented the damage by shearing away the burr.

# of your casing?

## WHY THE ROTO-VERT IS SAFE AND SIMPLE TO USE AND COSTS LITTLE TO RUN

This helix-blade-type scraper can be either "spudded" (reciprocated vertically) or rotated for the removal of gun-perforation burrs, imbedded bullets, cement sheath or other obstructions from the inside of the casing.

The body is machined from bar stock, with two sets—a total of six—rugged Blade Blocks positioned for overlapping, 360-degree scraping coverage. The most outstanding feature of the Blade Blocks is the direction and angle of shear of the scraping edges. The slant of these scraping surfaces is in a direction OPPOSITE from that encountered on other helix-blade-type casing scrapers, and the shearing edge is set at a smaller angle from the horizontal. These features result in the fact that the ROTO-VERT will not "screw" down past burrs as it is being rotated. And when it comes to removing cement sheath or other casing coatings, you are assured of actually removing the material with the ROTO-VERT, instead of merely cutting threads in it.

### REMOVING PERFORATION BURRS AND BULLETS

On rotary rigs best results are obtained by first running the ROTO-VERT Scraper *completely through* the perforated section WITHOUT ROTATION. This initial run will either shear or knock off the majority of imbedded or projecting bullets, and shear away most of the ragged perforation burrs. Then pull back the ROTO-VERT Scraper and rotate it through the perforated section. This second run permits the helix scraping edges to shear to their fullest extent, leaving perforation holes practically flush with the casing I.D., and the entire perforated section clean and restored to gauge.

When running the ROTO-VERT on tubing, or on a wire line (with suitable sinker bars and jars) it is merely run through the perforated section, then pulled back and run through again. If the ROTO-VERT runs through the perforated section smoothly (as indicated by checking the weight indicator) complete burr and bullet removal is a certainty.

### REMOVING CEMENT SHEATH, HARDENED MUD OR SCALE

Recommended procedure is to install the ROTO-VERT just above the bit when drilling out cement, to remove the thin sheath of cement always left, even though a maximum gauge bit is being used. Hardened mud, cement, paraffin, or mill scale are completely removed in a single run.

On old wells (or when rotary equipment is not present) the ROTO-VERT, run on tubing, will successfully remove various casing coatings WITHOUT ROTATION. A spudding action usually quickly clears up any rough or stubborn "tight spots."

A modified ROTO-VERT can be furnished to operate with equal success when run on a wire line equipped with sinker bars and jars.

## BAKER OIL TOOLS, INC.

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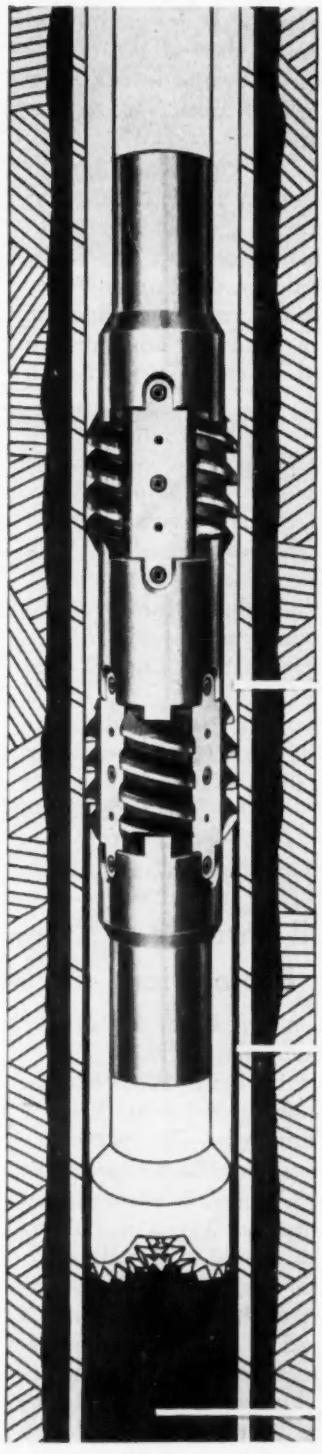

Even when a maximum gauge bit is used for drilling-out, a thin sheath of hardened cement remains to interfere with future operations. To visualize how ROTO-VERT removes this sheath, see left.

All cement, scale, burrs, etc., have been removed by the ROTO-VERT Scraper, and the vital "working surface" of casing is left clean and smooth.

This thin sheath of hardened cement always remains after the bit has passed.

Cement to be drilled out.

Cross-section of casing showing gun-perforation burr, before scraping . . .

and after ROTO-VERT was run.

This brittle cement sheath prevents the slips of pack-off tools from gripping the casing.

. . . Here is cut section of the same casing showing how slips tried, *unsuccessfully*, to set against the cement sheath.

## Call Baker

*for consultation and service on BAKER ROTO-VERT Casing Scrapers*

## 3rd Applicant Asks Alberta Gas Permit

A third application for permission to export Alberta natural gas to eastern or central U. S. now is before the Alberta Petroleum and Natural Gas Conservation Board.

Mid-Continent Pipe Lines, Ltd., is the latest company to file an application. This company would ship gas to eastern Canada from the Big Valley field, near Calgary, the Turner Valley field in southwestern Alberta, and the Peace River area in northwestern Alberta and northeastern British Columbia.

The line to eastern Canada would run through Saskatchewan and Manitoba provinces, crossing into the U. S. near Duluth, running across Michigan to a point near Sault Ste. Marie and returning to Canada to serve Sudbury, North Bay and adjacent areas in Ontario. Lateral lines would run to Toronto, Hamilton, Ottawa and Montreal.

Other applications pending are from Trans-Canada Pipe Lines, which would build an all-Canadian line, and Western Pipe Lines, which would serve central U. S. with a possible extension later to eastern Canada.

## Union Oil Entering Peruvian Exploration

The Union Oil Company of Los Angeles, California, is taking an active interest in Peru. With Messrs. Wiese, prominent Peruvian bankers and merchants who had previously applied for about 285,000 acres of concessions, Union Oil has organized a new company, Petroleo Sullana Ltda., with a capital of $2 million.

Union Oil has subscribed 40 percent of the capital of this national company, and by an operating agreement will carry out concession development. The concessions are in the northeastern part of Sechura desert, southeast of Sullana town.

In 1924, International Petroleum Company drilled a 6000-foot test west of Sullana which found only about 700 feet of Tertiary above the Cretaceous. It was dry.

Object of this new company's exploration is the possibility of oil bearing limestones in the Cretaceous, as in Venezuela. A United Geophysical Company crew has arrived to carry out geophysical surveys.

**SUSPENDED BRIDGE** across the Ticino River on the Cortemaggiore-Turin gas line.

## Pipe Lines to Ease Italy Gas Situation

During the past five or six years, Azienda Generale Italiana Petroli (Italian State Oil Department) has completed about 130 wells in the Po Valley and Central Italy region which have a capacity of producing 450 to 500 million cubic feet of methane gas daily.

The production cannot be fully used because of inadequate transportation facilities. However, this is being corrected by construction of pipe lines. Azienda Generale Italiana Petroli placed 788 miles of gas lines in operation during 1951, and 1280 miles in 1952, while 900 miles is scheduled to go into operation during 1953. This will give the country a total of 2970 miles of methane gas lines by the end of this year.

The most important line put in operation during 1952 was from the Cortemaggiore field to Turin. This 16-inch line has a daily capacity of 124 million cubic feet. A number of lateral lines serve various towns adjacent to the main Cortemaggiore-Turin system.

At present a 90-mile gas line is under construction from Cortemaggiore to Genoa. It also will serve a number of towns.

AGIP and its subsidiary, Societa Metenodotti Padani, are working on a gas line from Cortemaggiore which may be extended to Florence, Rome and Naples. This would involve 435 to 500 miles and be connected with new fields found at Ravenna, Imola, Forli, Port Recanati, Macerata, etc. This would provide for distribution of methane gas through much of the Italian peninsula.

Swiss interests have approached AGIP regarding extension of the Italian gas system to Switzerland, but negotiations have not been concluded.

## Pemex, Pauley Reported Discussing Gas Pact

Petroleos Mexicanos and the E. W. Pauley interests were reported close to agreement on a natural gas export contract under which Mexican gas will be sold to U. S. consumers. The only point still under discussion is the wording of the contract.

The gas will come from the important Treviño field on the U. S.-Mexican border, near the city of Reynosa. The Treviño field, in which Pauley has been drilling the past two years, now boasts more than 15 dual producing wells, with oil production of 3400 barrels daily and gas potential of about 137 Mmcf. daily. The gas wells were tested and then shut back for lack of commercial outlet.

Oil output is being consumed, in part, by the Pemex refinery in Reynosa. The remainder is being hauled out of the region by tank truck. Plans are under way to build a four-mile pipe line across the border to connect with the Continental Pipe Line Company line in Texas.

## German-Iraq Trade Pact Oil Deliveries Doubtful

In an addendum to the recently ratified trade pact between West Germany and Iraq, it has been stipulated that about 675,000 barrels of Iraq crude will be supplied to West Germany annually. This supply is royalty crude delivered to Iraq's government by the Iraq Petroleum Company.

Whether this crude will be supplied is doubtful. German firms importing sterling crude receive their consignments from the Iraq concession shares of their parent companies. Importers of dollar crude are bound to long-term contracts.

## Drilling Operations Scheduled in Israel

Considerable Exploration work is under way in Israel and drilling operations are scheduled to begin immediately.

Lapidoth-Israel Petroleum Company, Ltd., Jordan Exploration Company, Ltd., and Israel Oil Prospectors, Ltd., who own joint licenses covering 500,000 acres in the Dead Sea area, are starting their first drilling operation. A field camp has been set up four miles outside of Sodom, near the southern end of the Dead Sea. Lapidoth is in charge of operations, and has made a drilling contract with Kerr-McGee Oil Industries, Inc., of Oklahoma City. A cable tool rig already is in Israel and two rotary rigs are expected soon. A field crew of 20 men from the U. S. already is in Israel for Kerr-McGee. W. T. Foran, American geologist, is associated with Lapidoth-Israel.

Husky Oil Company, Cody, Wyo., is at present doing geological and geophysical work in the coastal area. Louis Franklin, Houston, independent oil operator, has been appointed manager of operations in Israel. J. C. Gilbert, an engineer and geologist with Husky, also is in Israel.

The New Continental Oil Company of Calgary, Canada, is doing geophysical work and expects to start drilling by December 1. Wayne Phares, of Calgary, is supervising geophysical work for New Continental.

Pan Israel Oil Company, Inc., and Israel Oil Licenses, Ltd., recently formed in Panama, are engaged in geological and geophysical work. Sidney Schafer, a geophysicist from Houston, and G. H. Brodie, geologist, of Denver, are directing this activity. The two companies were founded by a group of independent oil men, headed by William F. Buckley of New York.

## Pipe Line For Jalisco Is Nearing Completion

The oil pipe line to Guadalajara from Lagos de Moreno, connecting Mexico's second city with the important refineries at Salamanca, is nearing completion. The pipe line is being built at a cost of $3 million and will supply the State of Jalisco.

**CABLE TOOL RIG** which has arrived in Israel to be used for spudding in and shallow drilling operations of Lapidoth-Israel Petroleum Company, Ltd.


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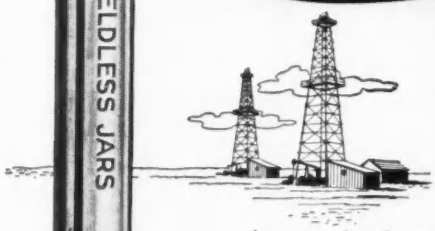

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# a WORLD of OIL

**Germany:** A total of 45,246,000 cubic meters of natural gas was produced in Western Germany during the first six months of 1953. This roughly corresponded to the yield during the first half of 1952.

Several fields produced larger quantities, but output at Bentheim and Frenswegen was cut down. The Boostedt oil field, which first appeared on the natural gas production list in January, produced 283,000 cubic meters during the first six months of the year. Two other new sources were added to the gas producing fields. These were the Molbergen and Voigtei oil fields.

**Canada:** More than one million barrels of crude was produced in the Province of Saskatchewan during the first half of 1953. Production during the month of June totaled 230,004 barrels, making a cumulative total of 1,197,086 barrels for the first six months of the year. . . . The first set of field orders under the Oil and Gas Conservation Act Regulations have been issued by the Saskatchewan Department of Mineral Resources. In general, the orders cover drainage units, production allowables, taking of cores and samples, release of well information, use of blowout preventers, casing heads and methods of salt water disposal in producing fields of Saskatchewan.

**USSR:** Five new oil fields in the Lena River area of Eastern Siberia are mentioned in Russian releases. They are: the Aldan field, located between the Indigirka and Aldan Rivers; the Kangalassy field near the Lena River's big bend; the Amaga field south of the Kangalassy field; and the Tolba and Olekma fields near Lake Baikal.

**Yugoslavia:** A new oil field has been reported found near Velika Greda. The well is said to have produced 20 metric tons the first day and 30 during subsequent days. The well was shut in temporarily, pending construction of transport facilities.

**Argentina:** Returning from Argentina, J. B. O'Connor, executive vice president of Dresser Industries, Inc., says that country will seek American participation in development of the country's oil and gas resources.

"President Juan Peron, in two long talks I had with him, emphasized his determination to make the nation self-sufficient within a second five-year program just starting," said the industrialist. "As a key feature of Argentina's new five-year program of economic expansion, the government will encourage American participation in the development of the country's oil and gas resources. This new policy has the full support of top government officials," O'Connor added.

Details of a comprehensive program are now being worked out to bring American companies and equipment to explore, drill and lay oil pipe lines, according to O'Connor.


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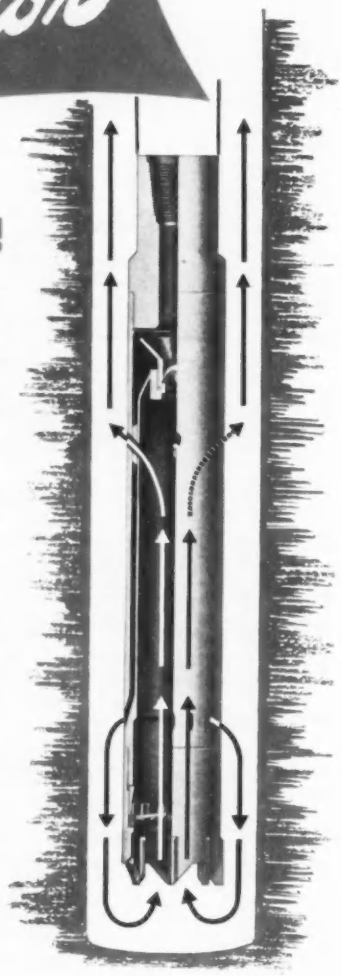
BRINGS IN JUNK!

By reversing normal circulation to literally pull objects into the basket, the BOWEN JUNK BASKET assures complete single-run recovery of all bottom hole junk.

Circulating fluid is diverted through side passages in the barrel and against the full circumference of the hole. Here the fluid is deflected, moving all objects toward center. Fluid flows in a continuous stream to the center of the tool and up through the barrel to return ports pulling all objects through the catcher. This reverse circulation action assures more complete recovery of junk in the hole and eliminates misruns. *Full pump pressure can be utilized* because there's no danger of pressure bearing against and causing loss of the fish.

***Comes in sizes from 3¾" to 17½" and is engineered to recover all types of bit cones used to drill hole sizes within its range.***



Reverse circulation at the bottom of the hole only.

FOR DETAILS
call the Bowen Service Store in your territory or write direct.

SR BOWEN CO

MAIN OFFICE AND PLANT:
11008 SOUTH NORWALK BOULEVARD
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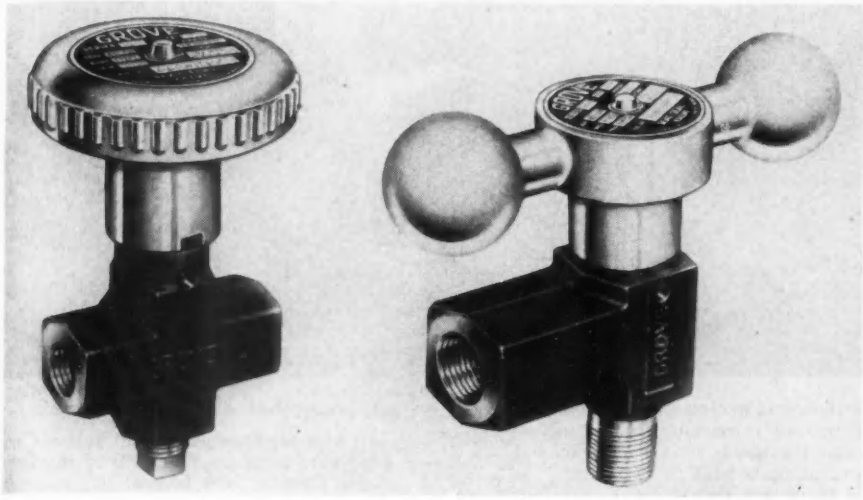
EXPORT REPRESENTATIVE: VAL R. WITTICH, JR.

# New Equipment

SUPPLEMENTING COMPOSITE CATALOG



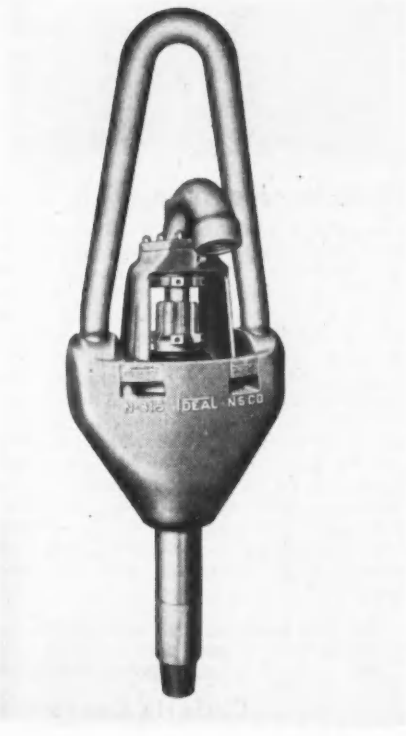
## Triport Valves and Gauge Cocks

In applying the Grove "seal-o-ring" principle to ¼-inch and ½-inch valves for pressures of 3000 to 10,000 pounds per square inch, Grove Regulator Company has introduced the Series T-2 triport valves and gauge cocks. Resilient "O" ring seals are utilized in the seat assembly to provide bubble-tight shut-off for flow in either direction as well as on the stem to replace conventional stuffing box packing. Minimum wear is claimed to result from the fact that the stem slides open and closed without turning. It is actuated by the handwheel, threaded to the outside of the integral bonnet.

Both ½-inch and ¼-inch Series T-2 triport valves are available for 300, 5000 and 10,000 psi. Half-inch gauge cocks are furnished for 10,000 psi in globe or angle design. Series T-2 valves are recommended by the manufacturer for meter manifolds, gauge lines, blowdown and similar services.

**This item supplements Grove Regulator Company data on page 2012 of the Composite Catalog, 19th Edition.**

**Circle No. 1 on Postcard**



## Swivel

A new and improved Ideal swivel has been announced by The National Supply Company. Normally used for 8000 to 15,000-foot drilling, it is designated the N-815 in accordance with a new plan tieing the swivel nomenclature in with drilling depths. Special features include a lower center of gravity to give greater stability in handling, a body streamlined for maximum safety and the use of a Uniflex wash pipe packing box assembly to provide an improved method of packing off the mud. A quick-seal hose connection is furnished as standard equipment. The swivel has a dead-load capacity of 400 tons. It has an overall height of 8 feet 10½ inches including the sub and an overall width of 39 inches. Wash pipe of the Uniflex assembly is of the free floating type, remaining concentric with the packing rings as they rotate. This prevents any reaming action on the rings because of eccentricity. Quick-breaking threads facilitate replacement.

**This item supplements The National Supply Company data on pages 3589-3720 of the Composite Catalog, 19th Edition.**

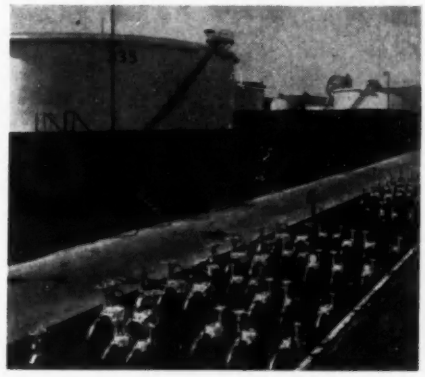
**Circle No. 2 on Postcard**

## Service Regulator

A new mercury seal version of its standard 107-1 service regulator has been introduced by Rockwell Manufacturing Company. Designed to relieve larger volumes of gas in emergencies, the modified "107-1" is being produced as a result of the revision of many utility safety codes—a revision calling for more effective relief devices. The new regulator will relieve a greater volume of gas than any other device of its type. For example, a modified 107-1 employing a 3/16-inch orifice with main valve assembly removed and 85 pounds inlet pressure will relieve 2400 cu. ft. per hour with an outlet pressure build-up of less than one pound. Dimensions of the new regulator are the same as those of the "107-1" except for the mercury well and vent, which are slightly larger than the inlet chamber and vent of the "107."

**This item supplements Rockwell Manufacturing Company, Pittsburgh Equitable Meter Division data on pages 4232-4235 of the Composite Catalog, 19th Edition.**

**Circle No. 3 on Postcard**



## Line Blind Valves

Union Oil Company recently installed 56 Hamer rigid type line blind valves during the modernization of a transfer manifold at the Wilmington refinery. The Hamer line blinds, which insure positive, permanent shut-off of the line, eliminated the need for an equal number of gate valves in the manifold. Due to conditions which prevent spreading of the pipe lines, the Hamer rigid-type line blinds use a unique internal-expansion principle which does not expand the line when the valve is opened to reverse the spectacle plate.

**This item supplements Hamer Oil Tool Co. data on pages 2305-2336 of Composite Catalog, 19th Edition.**

**Circle No. 4 on Postcard**

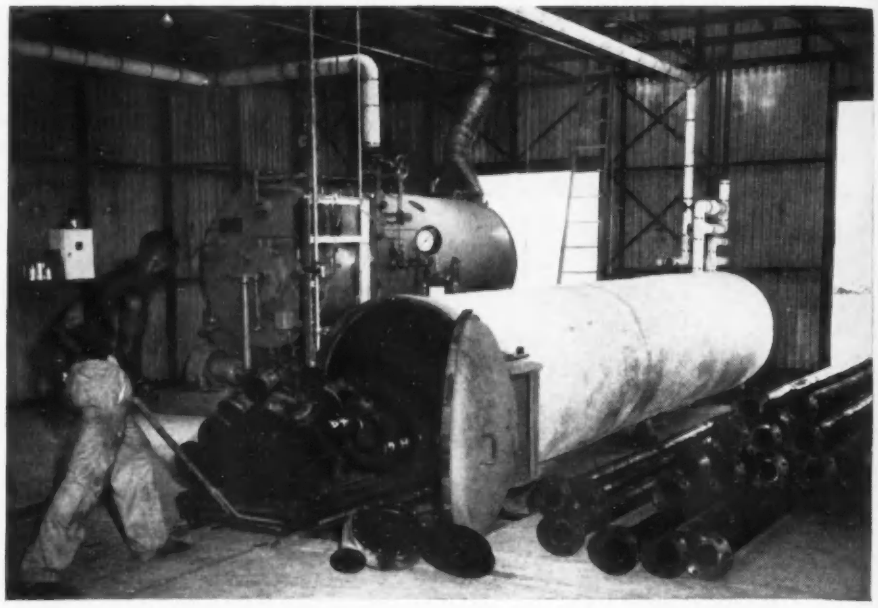
***Save time! Keep informed! Circle numbers on postcard, page 339***

## Rubber Lining Process

The Houston plant of Goodall Rubber Company of Texas, appliers of interior and exterior coatings for metal equipment, has announced the latest development in its rubber lining process. This development is a specialized method of molding soft or hard natural rubber, neoprene or other compounds to the flange ends and inner flow surface of metal pipes to be used for conveying chemicals and other solutions requiring protection against corrosion, abrasion or contamination. Advantages of the Goodall method, according to the company president, are its ability to meet exact tolerances, made possible by a method of molding during the curing treatment, and the elimination of flow obstructions caused by raised "rims" of ordinary coatings on the inner surface of the pipe where the couplings are joined.

After being sand blasted, the metal pipe to be lined is treated with a priming solution and coated with special tie cement. A tube of coating compound is adhered under pressure against the prepared inner pipe surface. Steel molds set at a predetermined thickness are inserted into the pipe ends and bolted to the flanges. A vulcanizing treatment molds in addition to curing the coating compound. As a result, no grinding is necessary to meet thickness tolerance or to reshape the joining pipe ends after the molds have been removed.

Pipe units with rubber linings and molds in place are shown being transferred into vulcanizer where they will undergo an eight-hour confined coring treatment.



This item supplements Goodall Rubber Company data on pages 2002-2003 of the Composite Catalog, 19th Edition.

Circle No. 5 on Postcard

## Industrial Engine

Le Roi Company has announced the addition of an 844 cubic inch displacement, valve-in-head, V-8 industrial engine to its line of internal combustion engines. Designed to provide continuous heavy-duty service over a wide range of speeds up to 2000 rpm, the Le Roi H844 is a sister unit to the well H540 which has proven itself in the oil fields as a power unit in electrical generating sets and on irrigation applications. The unit features removable wet-type cylinder sleeves, cam-ground aluminum pistons, a gear-driven water pump, an extra heavy counterbalanced crankshaft, full pressure lubrication and water cooled manifolds. The H844 can be equipped to burn natural gas, butane-propane or gasoline.

This item supplements Le Roi Company data on pages 3022-3025 of Composite Catalog, 19th Edition.

Circle No. 6 on Postcard

## Welding Electrode

A new welding electrode designed for built-up work and hard surfacing applications wherein the deposited metal can be machined or flame hardened has been announced by the General Electric Company's Welding department. The new electrode, designated G-E Type W-98, is a heavy covered flame hardening rod that can be used in all positions. The arc is of the steady spray type, similar to that produced by the E-6013 electrode. The W-98 can be used in build-up work on road machinery parts, gears, pinion teeth, pump housings, shafts, sprockets and ship hawse pipes. It is recommended when a higher hardness deposit is desired than that obtainable with electrodes used for under layers.

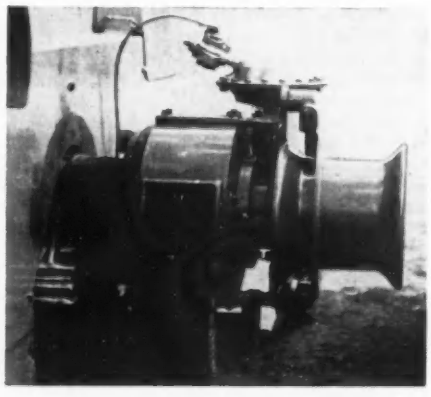
This item supplements General Electric, Apparatus Sales Division data on pages 1949-1968 of the Composite Catalog, 19th Edition.

Circle No. 8 on Postcard

## Breakout Cathead

The Foster Cathead Company is now presenting its No. 35 master breakout cathead especially designed for use on core drill and clean-out rigs. Suitable for mounting on lineshafts with a diameter up to three inches, the cathead is 19 inches long and 12½ inches in diameter. It has a line pull up to 10,000 pounds and is being used for both breaking joints and spinning pipe. The No. 35 master breakout cathead has a single point clutch adjustment which minimizes the time and effort required to give the cathead perfect adjustment.

This item supplements Foster Cathead Company data on pages 1757-1780 of the Composite Catalog, 19th Edition.



Circle No. 7 on Postcard

***Save time! Keep informed! Circle numbers on postcard, page 339***

# Drill faster and better with DRISCOSE* base emulsion mud!

In well after well, **DRISCOSE** has proved remarkably effective for emulsifying and stabilizing low pH sodium-base, high pH sodium-base and lime-base drilling fluids. **DRISCOSE** helps you get down to contract depth faster—with fewer bits and fewer rotating hours. **DRISCOSE** base muds provide good lubrication, too, with high suspension of cuttings . . . good control of viscosity and gel . . . less balling of the bit and drill collars. When you want excellent thixotropic qualities and a thin, strong filter cake coupled with low water loss, order **DRISCOSE** from your regular mud dealer. **DRISCOSE** really gets the job done in conventional or emulsion muds!

DRILL WITH

**DRISCOSE***

**DRILLING SPECIALTIES COMPANY** BARTLESVILLE, OKLAHOMA

*DRISCOSE is a trademark for Sodium Carboxymethylcellulose.

# Other New Equipment

## Air Cooled Engine

A new 6½ horsepower, air cooled engine is in production by Kohler Company. The K160 delivers 6.6 horsepower at 3600 revolutions per minute and combines moderate weight, 67 pounds with high horsepower. The K160 is a single cylinder, four-cycle, air cooled engine equipped with oil bath air cleaner, ball bearings, oil bathed fly-ball governor, fuel filter, rotating grass screen, silencer muffler, 1¼ gallon fuel tank. On model K160P there is a direct mounting crankcase; on model K160R, a 6:1 reduction gear; and model K160C a hand clutch. The cooling system has been designed to provide a large volume of cooling air around the cylinder and head area to maintain correct temperatures under all operating conditions. The engine is easily serviced.

**Circle No. 9 on Postcard**

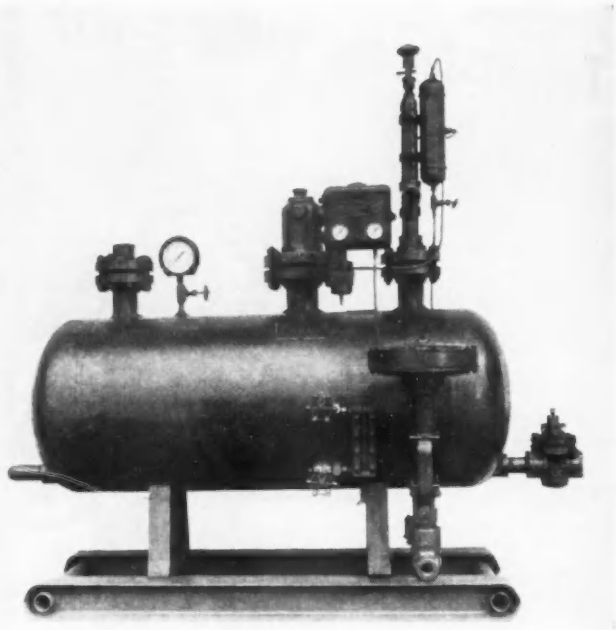
## Instantly Soluble Gums

Aqualized gums, manufactured by the Soluble Products Company, are available in powdered form. Standard aqualized gums offered are Tragacanth, Karaya, Locust Bean, Arabic, CMC. All types of gums can be aqualized. A special process enables all water soluble and water dispersable gums to develop full viscosity on introduction to cold aqueous media without any special heating, aging or agitation. Clumping and unreacted dry cores of gum are completely eliminated. Uniformity from batch to batch is easily maintained. A new process renders gums 100 percent effective in cold water and marked improvement is noted in finished products. It is used in drilling mud conditioner, drilling muds, viscosity control, emulsion control, and lubrication.

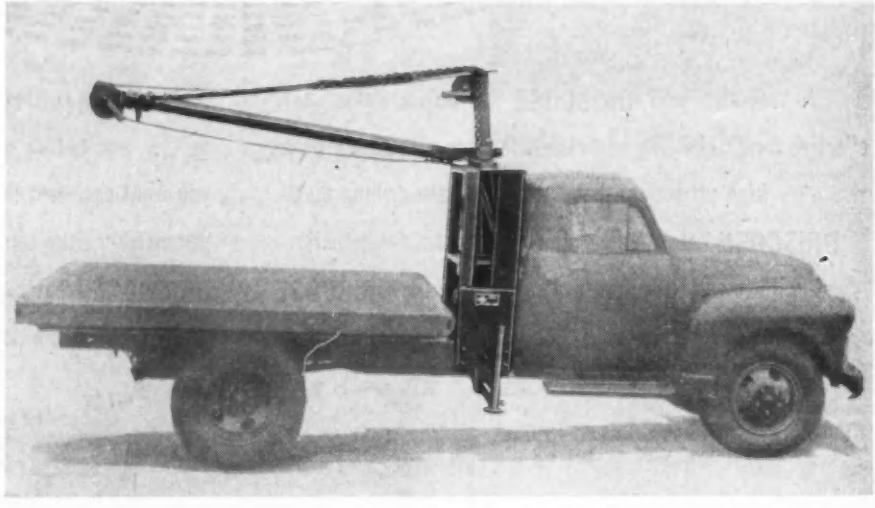
**Circle No. 10 on Postcard**

## Water Knockout

A new free-water knockout for removing liquid water from natural gas lines has been developed by Oil Metering and Processing Equipment Corporation. The unit is designed with one single tube vessel and has rugged controls that assure satisfactory operation under the most adverse conditions. The free-water knockout separates the free liquid water from the natural gas by means of gravity difference and also by a coalescing mist extractor. Water is discharged separately while distillate is discharged with the gas. Discharge of liquid hydrocarbons with the gas occurs through a siphon nipple inserted in the gas discharge connection of the vessel. Removal of this siphon nipple changes the unit from a free-water knockout to an all-liquid knockout. The unit requires no housing to protect it from outside interference. Drilling mud and sand can be quickly flushed from the unit through connections provided. It is universal in application since it can be changed from free water to all liquid knockout and the liquid levels can be easily changed. The free water knockout is available in all sizes and working pressures. The unit shown is 24-inch outside diameter by 5 feet 6 inches long by 1000 psi and will handle up to 15 Mmscfd.



**Circle No. 11 on Postcard**



## Truck Crane

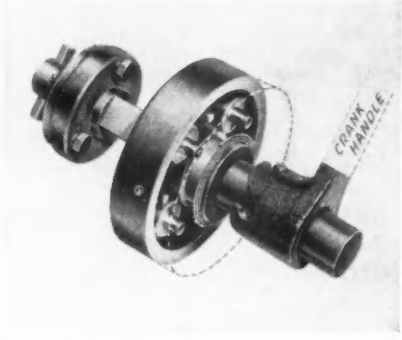
A line of loaders adaptable for use on any truck has been announced by the Ray-Lind Manufacturing Company. Available in a wide range of capacities from ½ to 2-ton lifts, the unit converts a truck into a self-loading truck-crane that speeds scores of materials handling jobs. The Ray-Lind loaders are particularly adaptable for use in logging, mining, oil, con-

***Save time! Keep informed! Circle numbers on postcard, page 339***

struction and utility operations. The crane unit mounts directly behind the cab and occupies only from 16 inches to 18 inches of space. There is no reduction in truck body or platform capacity and the entire load carrying capacity of the bed is retained. Installation is simple as there is no need to cut or alter the truck body.

The loader is made in two models; one with an elevating mast, and one with a fold over superstructure. Standard loaders will pick up loads from any radius up to 16 feet. On the fold-over models, the boom swings 170 degrees; on the elevating mast models the swing is a full 360 degrees. Power for hoisting is supplied by the truck engine through a power take-off. The winch clutch, brake and transmission controls, together with the boom brake, are conveniently grouped and mounted for ease of operation.

**Circle No. 12 on Postcard**




## Safety Crank

A cranking device that eliminates injury hazards from engine "kickback" is being marketed by the Safety Crank Co. A number of pipe line, transportation and other industrial concerns are using it. The crank can turn only in one direction, the manufacturer says. If the engine kicks back, four cams jam against the shaft hub so the crank cannot spin counter clockwise. The shock of the kickback is absorbed by the crank's friction clutch, preventing damage to the engine. Safety crank fits any engine that is started by crank or rope pulley or has a place to put one. A bracket adapter and rope or pulley is supplied with the safety crank to fit any type of engine.

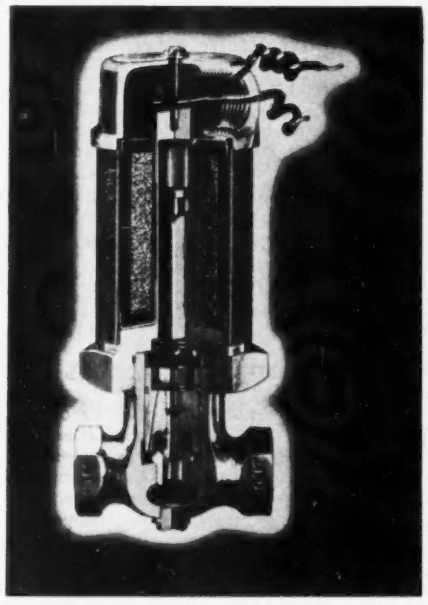
**Circle No. 13 on Postcard**

## Selenium Rectifiers

A complete new line of air-cooled selenium rectifiers has been announced by Holcombe & Stearns, Inc. These field proven rectifiers are simple, low cost, rugged, and lightweight and offer practical and economical cathodic protection for pipe lines, cables, tanks, and water systems. A universal stack mounting enables quick interchange of stacks. Extra large knurled knobs make it easy to make voltage adjustments with the fingers. Transformer taps are made exceptionally rugged by forming each tap from the heavy transformer winding, eliminating the possibility of loose solder and hidden connections.

The new model has a rugged aluminum case and a removable cover to allow accessibility from three sides. A weatherproof plexiglass window is provided on the face of the cover for quick and easy reading of the meters without having to remove the case. Efficient cooling is assured by full openings under the weatherhood and the entire open bottom of case. All openings are protected with bronze wire mesh.

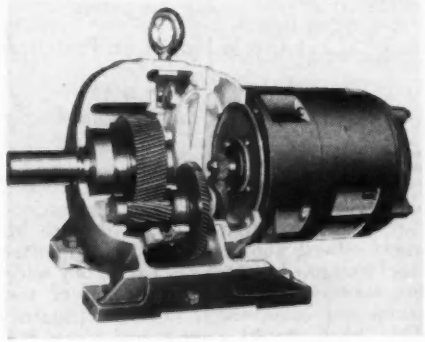
**Circle No. 14 on Postcard**



## Steam Valve

Atkomatic Valve Company announces a steam valve offering new engineering principles which prevent "sticking," a common cause of most steam valve failures. Expansion caused by high temperatures combined with deposits of iron oxide, boiler compound, lime, formerly caused sticking and down time for maintenance. Engineering principles incorporated in the design now automatically compensate for normal steam valve expansion and deposits, assuring greater valve efficiency, longer valve life and lower maintenance costs.

**Circle No. 15 on Postcard**



## Gearmotors

Century Electric Company has announced the availability of a complete new integral gearmotor series from one to 15 horsepower. The motors are offered in a wide range of speeds, in single, double and triple gear reductions. Motors are available with constant or variable speeds and with protective frames to operate under most atmospheric conditions. In the new gearmotors, gears meeting AGMA Class I, II and III specifications can be obtained to fit varying load requirements.

**Circle No. 16 on Postcard**

## Hydraulic Pumps

The Berry Division of Oliver Iron and Steel Corporation has announced the availability of its larger horsepower 32-10 series rotodraulic hydraulic pumps, fluid motors and transmissions. Designed in the rotating piston design, these units may be used as either pumps or fluid motors interchangeably. In either case they are instantaneously reversible with equal performance in either direction of rotation. As pumps the displacements are 60, 120 and 180 gallons per minute at 1000 pounds per square inch continuous, 1500 psi intermittent. Built-in gears allow direct connection at 1200, 760, or 472 revolutions per minute. Overhung belt or chain drives are permitted. When used as fluid motors, ratings up to 300 hp and 19,000 pound inches of torque are obtainable at 1100 rpm. This larger series of units will be applicable on earthmoving equipment, cranes, marine vessels, mining machines, sawmills, steel mills, drilling rigs, and many others.

**Circle No. 17 on Postcard**

## Disconnect Coupling

Hallett Manufacturing Company has expanded production facilities to promote its new quick disconnect couplings for coaxial cable applications. These multi-purpose units are the smallest size yet produced with the quick disconnect feature and have injected molded and machined Teflon insulators, beryllium copper receptacle connections that surpass a high voltage potential of 7000 volts rms at 60 cycles for one minute, and all metal parts silver plated to .0002 min. of maximum density. The coupling also conforms with all government specifications.

**Circle No. 18 on Postcard**

***Save time! Keep informed! Circle numbers on postcard, page 339***

PERFORATE TUBING IN THE WELL

KINLEY TUBING PERFORATOR

*M. M. Kinley Company Licensees*

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CORPUS CHRISTI
Tubokut Wire Line Service . . . . . 5-1811
Tuboscope . . . . . 3-3512, 4-3137
HOBBS
Cecil Horne . . . . . 3-5396
HOUSTON
Tuboscope . . . . . JU-0577, MO-4279
KILGORE
Tuboscope . . . . . 5198, 5218
MIDLAND
Luccous . . . . . 4-8471, 4-4320
NEW IBERIA
Tuboscope . . . . . 2-3831, 4-1327
NEW ORLEANS
Associated Engineers, Inc. . . . . AU-7696
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Tuboscope . . . . . 2-5663

MOVE Rigs and set 'em up FASTER with SIMPLEX SCREW JACKS

Many drillers are saving time by permanently attaching Simplex Screw Jacks to the underside of their rig floor. When the rig is to be moved, turnbuckle bracing is unfastened and jack is swung up, out of way. At new location, jack is swung down, turnbuckles attached and jack is ready to level rig. Jack can't get lost, is always available for use.

There's a complete line of Simplex jacks—screw, lever, hydraulic—for all oil field uses.

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Jacks

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# New Catalogs and Equipment Literature

## Friction Clutches

An illustrated engineering data sheet describing the new line of Morse torque-limiting slip type friction clutches which provide overload protection for a variety of machine drives by functioning as an automatic shear pin mechanism is now available from Morse Chain Company. The data sheet includes dimensions and capacities of standard 4½, 5½, and 6½-inch diameter adjustable clutches. Tables of specifications of standard Morse type A plain plate roller chain sprockets that can be used in connection with the compact torque-limiting clutches are also included.

**Circle No. 19 on Postcard**

## Engineering Data Sheets

A series of engineering data sheets for the petroleum industry is available from Wall Colmonoy Corporation. These sheets give information pertaining to the application of Colmonoy nickel-base and iron-base hard facing and Spraywelding alloys that resist abrasion, corrosion, impact and galling. Typical petroleum industry equipment applications are described in detail including procedures, part sketches, equipment requirements and results.

**Circle No. 20 on Postcard**

## National Supply Bulletins

Several new bulletins on wellhead equipment, hook blocks, hoist, rigs, and gas drilling engines have been issued by The National Supply Comany. The Ideal Consolidated Type T-20 rig and the Type T-32 Consolidated rig are described in special bulletins. A bulletin on the T-12 Hoist emphasizes construction of the hoist and features controls; and includes performance charts, dimensional diagrams, specifications and mobile mounting.

**Circle No. 21 on Postcard**

## Oilwell Pump

A bulletin giving details of the manufacture and distribution of the Gall Type M insert oilwell pump is available from Pacific Pumps, Inc., which has taken over the manufacture and distribution of the pump and converted it to API standards. This pump creates a fluid well above the plunger which protects the plunger and liners from abrasives and pressures. The plunger is held in a rigid stationary position and the liner barrel travels over the plunger. The traveling valve is located in the bottom of the traveling barrel and the standing valve is set at the bottom of the stationary barrel. There are no valves in the plunger assembly; therefore, the plunger acts as the macaroni string in the pump and the tubing above the seal acts as the macaroni string above the pump.

**Circle No. 22 on Postcard**

## Helicopter

Bell Aircraft Corporation has available a 40-page booklet giving detailed information on the new Bell 47G Helicopter. The illustrated booklet features oil industry applications of the helicopter including extensive usage in connection with exploration and mapping work, transportation of personnel and equipment to off-shore drilling operations and pipe line and communications patrol.

**Circle No. 23 on Postcard**

## Hard-Facing

An analytical study of hard-facing, its application and its wear-resisting qualities wherever impact and abrasive conditions exist are contained in a new 52-page brochure published by the Mir-O-Col Alloy Company. This report incorporates the latest data and instructions on hard-facing, as well as new information about Mir-O-Col's own line of hard-facing metals. A special section of the report, the application index, recommends specific hard-facing rods for more than a thousand individual pieces of equipment subject to impact and abrasion.

**Circle No. 24 on Postcard**

## Welding Hose

A new color bulletin on welding hose is offered by Quaker Rubber Corporation, Division of H. K. Porter Company, Inc., in which types of welding hose produced by this company are described. Cross section and cutaway photographs in actual colors of the various types of Quaker welding hose are included as well as constructions, performance data, recommended uses, sizes, working pressures, weights and lengths. Another bulletin issued by this company explains a number of different uses for the company's line of air hose. The uses vary from heavy duty construction through digging and drilling operations.

**Circle No. 25 on Postcard**

***Circle numbers on postcard, page 339***

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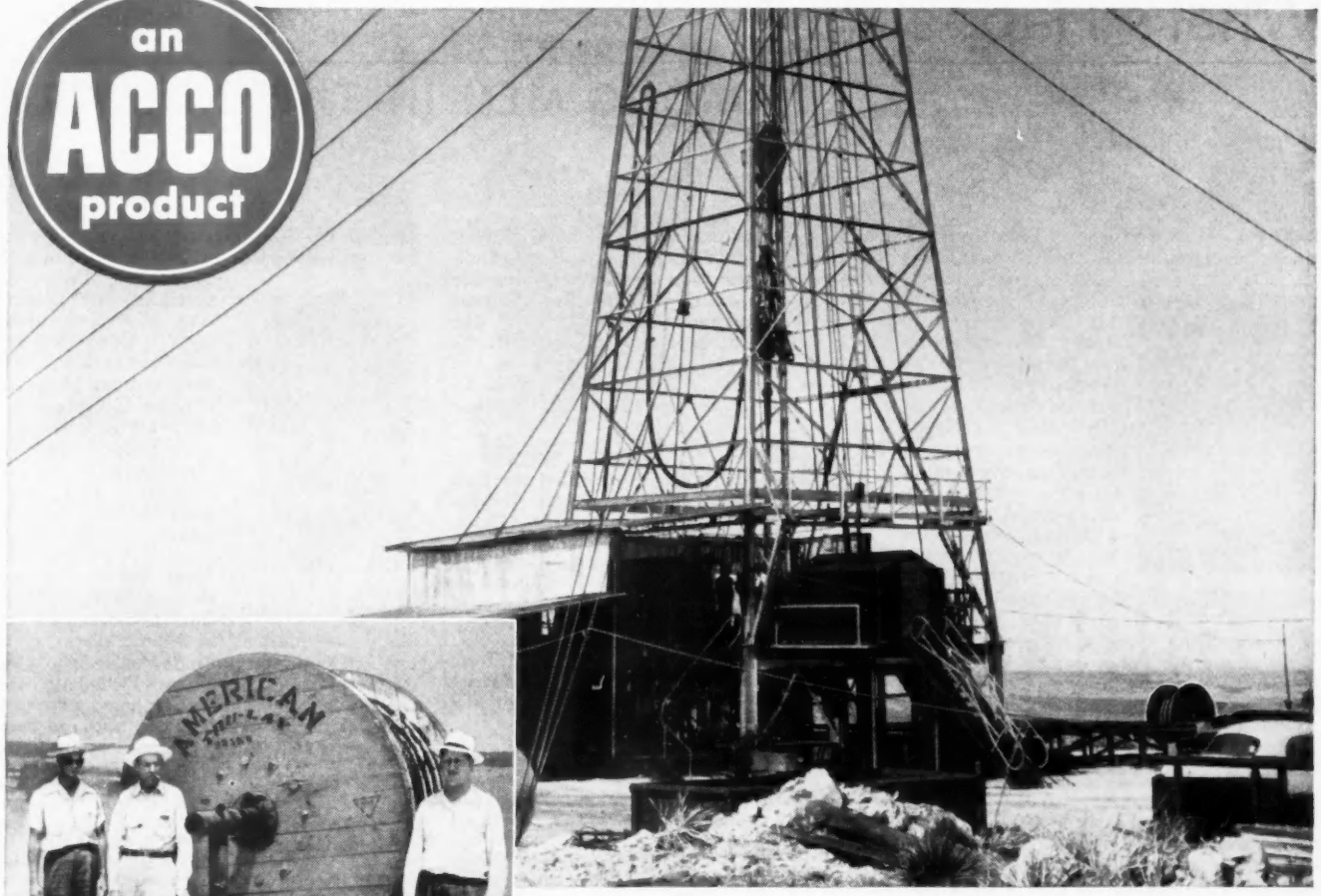


**Above:** Davidson Drilling Company rig drilling Stanolind Guadalupe No. 1 in the hills west of Carlsbad, N. Mex.

**Left:** (L to R) G. E. Clements, tool pusher, and C. I. Woodroof, drilling supt., of Davidson Drilling Co., Odessa, Tex., and T. R. "Cotton" Foster, TRU-LAY field man.

# Why Bigger, Longer TRU-LAY Drilling Lines Cost Less to Use

• Larger diameter lines permit heavier loading and the advantages of fewer parts of line. And when a long line which allows for regular cut-offs is used, some mighty high ton-mile records can be run up. These are the reasons why the Davidson Drilling Company used a 7500-foot 1¼" TRU-LAY Preformed Rotary Drilling Line on this wildcat way back in the New Mexico hills.

Cut-off practices set forth in American Cable's Ton-Mile Record Book will help you get every last dollars worth of service out of a TRU-LAY drilling line. You pay nothing for this book, but it will save you money—and that sure is important these days. See your American Cable distributor today. Let him explain this new ton-mile method and show you how you can use it.

Your American Cable distributor has TRU-LAY Preformed drilling lines in stock for immediate delivery at all important drilling centers.

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makers of ACCO Registered WIRE ROPE SLINGS

# What's Happening

## AMONG MEN IN THE INDUSTRY

**Robert L. Hoss,** formerly a petroleum engineer for Humble Oil & Refining Company, has resigned to accept the position of division engineer, Rocky Mountain area for the Midwest Oil Corporation. Hoss joined Humble in 1947 after receiving his master's degree in petroleum engineering from the University of Texas. A native of Tulsa, he received his B.S. degree in petroleum engineering from the University of Tulsa in 1942, after which he spent three years in the U. S. Army Air Force during World War II. He was awarded the Alfred Noble Prize for 1948, the second man in the petroleum industry to receive this coveted award. He will be located in Midwest's Denver office.

Robert L. Hoss

•

**Virgil E. Spradlin** has announced his resignation from Skelly Oil Company in Wichita, Kansas, and his appointment as distirct geologist and agent, Kansas district, for Mayfair Minerals, Inc. Spradlin, a graduate of the University of Oklahoma, was district geologist in Kansas for The Pure Oil Company prior to joining Skelly. Mayfair's headquarters in Wichita will be in Suite 508, Rule Building.

•

**Tatham R. Eskrigge,** formerly with the Production Division, Gulf Refining Company, New Orleans, has announced the opening of a geological consulting office in lease appraisals and evaluation problems at 610 South Peters Street, New Orleans.

•

**William H. Spomer,** assistant comptroller of The Pure Oil Company, has been named comptroller to succeed the late **James H. Botkin.** Spomer will continue to have headquarters in Chicago.

•

**Dwight L. Clarke** of Los Angeles, member of the board of directors of Occidental Life Insurance Company of California and chairman of its advisory council, has been elected to membership on the board of directors of Bishop Oil Company. Clarke fills a vacancy created by the resignation of **William Wallace Mein,** who founded Bishop in 1920 and served as its president until May, 1953, when he became chairman of the board. Mein will continue to serve the company in an advisory capacity.

•

**Nick Van Wingen,** Pacific Coast petroleum engineer, and vice president of Petroleum Technologists, Inc., Montebello, Calif., has resigned from his position with Petroleum Technologists, Inc., to engage in private practice as a consultant with offices at 903 Fair Oaks, South Pasadena. He will retain his place on the firm's board of directors.

Changes in supervisory and staff personnel of Standard Oil Company of California's Exploration department include new appointees, **E. C. Doell** and **Antonie Paap,** both assigned to the staff of the chief geologist in San Francisco; **H. C. Bemis,** exploration superintendent for the Southern District, Los Angeles; and **E. G. Dobrick, Jr.,** chief geophysicist, Oildale.

•

**F. M. Hoover** has been appointed research geologist for the Mid-Continent division of Cities Service Oil Company (Del.). Hoover will continue to make his headquarters in Oklahoma City where he has been stationed since 1936.

•

**Paul Hyatt** has been transferred from Bartlesville to Oklahoma City as district geologist for Cities Service Oil Company (Del.).

•

**Frank E. Rehm,** vice president of Shell Oil Company, has retired after 37 years with Shell. For the past decade he has been the Pacific Coast vice president — personnel and industrial relations with headquarters in San Francisco. A native of Sonora, Calif., Rehm began his career in the petroleum business by working in the California oil fields during his summer vacations while he was an undergraduate at Stanford University. Rehm joined Shell as a geologist in 1916. After several promotions Rehm moved to San Francisco in 1939 to organize a new personnel and industrial relations department of which he was named vice president. Rehm will continue to serve as secretary-treasurer of the Pacific Oil Institute.

Frank E. Rehm

•

**W. M. Paggie** has been appointed to the newly created position of assistant superintendent of Sun Oil Company's Houston district. Paggie, former field superintendent of the North Markham-Bay City area, will retain his office in that area. **J. O. McPherson** is district superintendent with offices in Houston.

•

**Dean C. Wellman** has been named manager Rocky Mountain area for The Derby Oil Company with offices in Denver. Wellman has been in charge of the Denver office since its opening two years ago. **Roland R. Toevs** of Derby's Wichita Land department has been temporarily transferred to the Denver office as landman for this area. Offices are located at 705 Denver National Bank Building in Denver.

**Donald W. St. Clair,** consulting geologist, has opened offices at 910 W. Tennessee, Midland, Texas, to specialize in exploration, geological valuation, geophysical coordination and management. A graduate of Colgate University with a M.S. degree from Syracuse University, St. Clair served a short time with the U. S. Geological Survey, then spent 10 years with Shell Oil Company doing surface, subsurface, and research geology over most of the Midcontinent, eastern and Gulf states. In 1945 he opened an office in Midland under DeGolyer and MacNaughton for the Doheny interests, and has been managing the Midland area for various Doheny companies until recently.

Donald W. St. Clair

•

**John R. Parker** and **James G. White** announce the formation of the partnership, Parker-White Drilling Company, rotary drilling equipment to 10,000 feet. Offices are in the Central Building, Midland, Texas.

•

**John E. Schalk** has resigned as vice president of the R. L. Manning Co. and is organizing the Arapahoe Drilling Company with headquarters at Denver, Colo. The Arapahoe Drilling Company will engage in rotary drilling contracting and oil field servicing in the Rocky Mountain area with emphasis initially on the Denver-Julesburg Basin. Schalk has been with the Fred M. Manning Co. and its successor, the R. L. Manning Co., for the past nine years.

•

**J. M. Welsh,** formerly associated with Bovaird Supply Company, has joined the Harry Hines Oil Company and Barney Hilburn Drilling Company in the drilling contract and land departments with offices at 609-10-11 Gulf States Building, Dallas, Texas.

•

**Harold E. (Orbie) Orbison,** oil statistician, Crude and Products Department, Tide Water Associated Oil Company, has retired from the company after more than 44 years with Tide Water Associated and its West Coast predecessor, Associated Oil Company. Orbison joined the company at McKittrick, Calif., in 1908 and until 1919 he worked in a number of the California oil fields and in the San Francisco general offices. After serving in Wyoming as chief clerk, he returned to San Francisco in 1925 and has been employed in the San Francisco offices as a member of the Transportation and Crude and Products departments for the past 28 years.

C. Z. Hardwick

H. H. West

**E. B. Redpath**, who 48 years ago joined The Ohio Oil Company as office boy, retired September 1 as director and executive vice president of the company. **H. H. West**, secretary, has been elected to the board of directors to fill the vacancy caused by Redpath's retirement. West continues as secretary. **C. Z. Hardwick**, formerly vice president and manager—refining and marketing, has been elected vice president succeeding Redpath. Hardwick became a director of the company in 1948. Redpath has served as director since 1932 and was elected executive vice president in 1951. West joined the company in 1922 and Hardwick became associated with the company in 1921.

E. B. Redpath

•

**Raymond B. Kelly**, manager of The Pure Oil Company's Texas Producing Division at Fort Worth, has been elected senior vice president—crude oil exploration and production. Kelly will succeed **Comer Plummer**, who will continue as a director and member of the executive committee of the company. Kelly, a native of Chicago, has served in the company's producing divisions for 28 years.

•

**H. N. Kinney Brookings** has resigned from Phillips Petroleum Company to become a consulting geologist. His office is at 3701 Eddy Place, Shreveport, La.

•

**John H. Thacher** has been elected a vice president of California Research Corporation by the board of directors of this subsidiary of Standard Oil Company of California. A petroleum engineer and geologist, Thacher has been with Standard since 1930, serving in varied capacities in the field of oil and natural gas production. For the past three years Thacher has beeen executive assistant to the vice president. In his new post he will take over direction of the oil field research program now headed by **E. G. Gaylord**, who retired October 1, Gaylord, who served as a vice president and director of California Research since 1947, is a petroleum engineer whose California oil field experience dates back to 1911.

•

**Leonard W. Heiny**, Salt Lake City, Utah, geologist for Continental Oil Company, has been promoted to assistant division geologist with headquarters at Billings. Heiny, a graduate from Mesa County Junior College and the University of Colorado, joined Continental in 1949 as a geologist at Casper, Wyo., and served a year with Conoco at Elko, Nev., prior to his transfer to Salt Lake City in 1951.


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lightweight couplings for grooved pipe systems

LIGHTWEIGHT

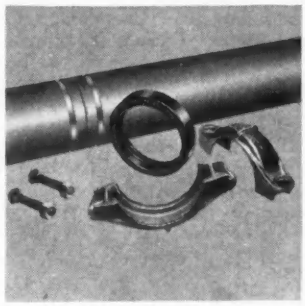
Up to 45% lighter, GRUVAJOINTS offer real freight savings; are easier to work with than ordinary couplings.

COMPACT

GRUVAJOINTS' trim design means quick application even in close working space; easy handling; convenient storage.

LOW COST

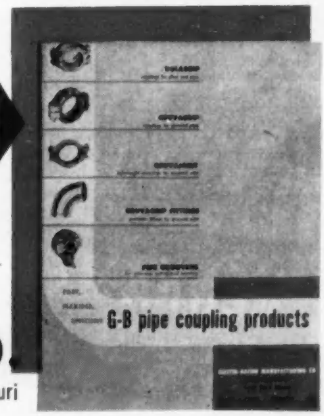
New GRUVAJOINTS cost less than conventional grooved pipe couplings.



**Hot from the foundry,** GRUVAJOINTS fill your need for low cost, lightweight couplings for 2", 3" and 4" grooved pipe lines carrying pressures up to 500 psi. GRUVAJOINTS are simple to apply and remove; automatically allow contraction and expansion, line movement and layout misalignment. They can be used over and over again. Their entire surface is protected with green rust inhibitor.

GRUVAJOINT sealing gaskets are interchangeable with GRUVA**GRIPS** (standard weight grooved pipe couplings). GRUVAJOINTS couple perfectly with GRUVAGRIP FITTINGS.

You'll see GRUVAJOINTS at your supply stores soon.

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Made of corrosion-resistant titanium carbide, ⅓ lighter than steel. Minimizes down-well check valve trouble caused by ball flutter, cage wear, and fluid pounding.

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PUTS AN END TO DOWN-THE-HOLE CHECK VALVE TROUBLE


**R. B. "Bob" McCloy,** formerly with Stanolind Oil & Gas Company, has joined Decem Drilling Company, Inc., as vice president. He will be at the company's headquarters in Oklahoma City. McCloy served Stanolind for 11 years in various capacities, and was drilling superintendent of the Oklahoma City division at the time of his resignation. McCloy was educated at Carnegie Institute of Technology and the University of Pittsburgh. He received a degree in petroleum engineering. For six years he was with Gulf Research and Development Corporation, followed by three years in field work with Gulf Oil Corporation and two years with Union Carbide and Carbon before joining Stanolind Oil & Gas Company.

R. B. McCloy

•

**J. A. Horner** has been appointed secretary of Shell Oil Company to succeed **F. W. Woods,** who retired. Horner formerly was administrative assistant to the president and assistant secretary.

•

**Fred W. Bush,** formerly manager of lands, Pacific Coast area, for Union Oil Company, has been appointed manager of exploration, Williston Basin Division, with headquarters at Bismarck, N. D. **Howard Said,** formerly assistant manager of lands, Pacific Coast area, and **K. C. M. Anderson** becomes administrative assistant for the Field department, a newly created position. **B. B. Brison,** formerly in Union's field office in Santa Paula, will join the head office group as assistant manager of field operations, Pacific Coast. **W. E. (Bill) Morgan** continues as acting manager of operations, Rocky Mountains Division, with headquarters at Denver.

•

**T. D. Craft,** Tallahassee, Fla., division land superintendent with Continental Oil Company's southern region Exploration department, has been transferred to San Antonio, Texas, as division land superintendent. Craft was associated with other oil companies for 17 years before joining Conoco in 1952 as division land superintendent at Tallahassee. **J. H. Gobb,** San Antonio, division land superintendent, has been appointed division land superintendent at Tallahassee succeeding Craft.

•

**John H. Gatchell** has joined the staff of the Production and Exploration Division of Lion Oil Company as a geologist. Gatchell will be attached to the central region with headquarters at Wichita, Kansas. He holds a B.A. and a M.A. degree in geology from the University of Missouri and has been an instructor in geology at Christian College, Southwest Louisiana Institute and the University of Missouri. Prior to his employment by Lion Oil, Gatchell was assistant district geologist for Atlantic Refining Company at Wichita, having been with that company for five years.

•

**J. L. Popham,** petroleum engineer in Houston, has joined Continental Oil Company as senior research engineer in the Development and Research department, Ponca City, Okla.


**CUT STUCK SAND LINES IN THE WELL**

**KINLEY SAND LINE CUTTER**

***M. M. Kinley Company Licensees***

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Hudson-Eads, Inc. - - - - - - - - - - 2-5331
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Wireline Specialties Co. - - - - - - 3-2196
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HOUSTON
Adair Service Co. - - - - WE-6497, PR-4652
Tuboscope - - - - - - - JU-0577, MO-4279
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Luccous - - - - - - - - - - 4-8471, 4-4320
NEW IBERIA
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Walter Kalteyer

Hulen H. Hunt

**Hulen H. Hunt** and **Walter Kalteyer** have organized a new drilling company, Hunt Drilling Co., Inc., with offices at 634 Wilson Building, Corpus Christi, Texas. The new company will operate rotary rigs. Hunt, who will serve as president, is a graduate of Baylor University and was for 13 years a scout with Gulf Oil Corporation in South and East Texas. Kalteyer, vice president and general manager, is an engineering graduate of the University of Texas. He served as engineer with Humble Oil & Refining Company for eight years specializing in drilling equipment. Kalteyer was district petroleum engineer at Pleasanton, Texas, at the time of his resignation. **Coy Pyle**, tool pusher with Allen and Morris, drilling contractors, for 10 years, has been engaged as senior tool pusher for the new company.

•

Appointments in the Geophysics Division of The California Company include **R. H. Howe**, northwestern division geophysicist at Bismarck, N. D.; **A. L. Lyth**, southeastern-eastern division geophysicist at Jackson, Miss.; **O. A. Poirier**, offshore geophysicist at New Orleans, La.; **E. B. Wasson**, western division geophysicist at Denver, Colo.; and **R. G. Wegener**, southern (inshore) division geophysicist at New Orleans. These positions have been established to advise the respective division exploration superintendents on all aspects of geophysical work, including program planning and interpretation and to supervise the geophysical personnel and work in the field and at division headquarters. **J. W. Northrop, III**, senior geophysicist, will advise the geophysics superintendent and division geophysicists on technical problems, as well as adapt research results to company geophysical operations and direct the geophysics division's central computing work.

•

**Marvin C. Gentry**, formerly district producing superintendent of Magnolia Petroleum Company's Healdton, Oklahoma, district, has been transferred to Shreveport, La., where he will be superintendent of the Shreveport district.

•

**J. B. Taylor**, assistant auditor of the Macmillan Petroleum Corporation, has been promoted to auditor.

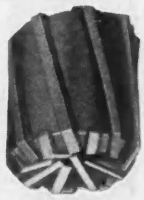
•

**Thomas J. Garin** of Oil City has been appointed curator of Drake Well Memorial Park. The museum at Drake Park, on the site of the world's first well drilled for oil, contains relics and documents of historical importance. Garin will continue as director of information for the Pennsylvania Grade Crude Oil Association in Oil City, a post he has held since 1944.


# USE KINZBACH WHIPSTOCKS AND MILLS TO SIDETRACK YOUR HEADACHES

Type "A" Mill

Type "D" Mill



Type "H" Mill

Type "I" Mill

Kinzbach Whipstocks can be set at any depth and require no support for the bottom. Positive setting slips prevent slipping or turning in the hole. The Kinzbach hinge arrangement assures that the top of the Whipstock will be close against pipe wall at all times, permitting easy passage of drilling tools. Setting trigger always locates the Whipstock between couplings so that the window will be within one joint. Kinzbach Whipstocks are available in all popular casing sizes through your supply store.

Use Kinzbach Milling Tools for every whipstocking or metal cutting operation. They have high-speed tool steel inserts which are ground and set at the most efficient angle for fast, uniform cutting action. Shown at left are four popular models—see your Kinzbach Catalog for a description of the complete series of Milling Tools.

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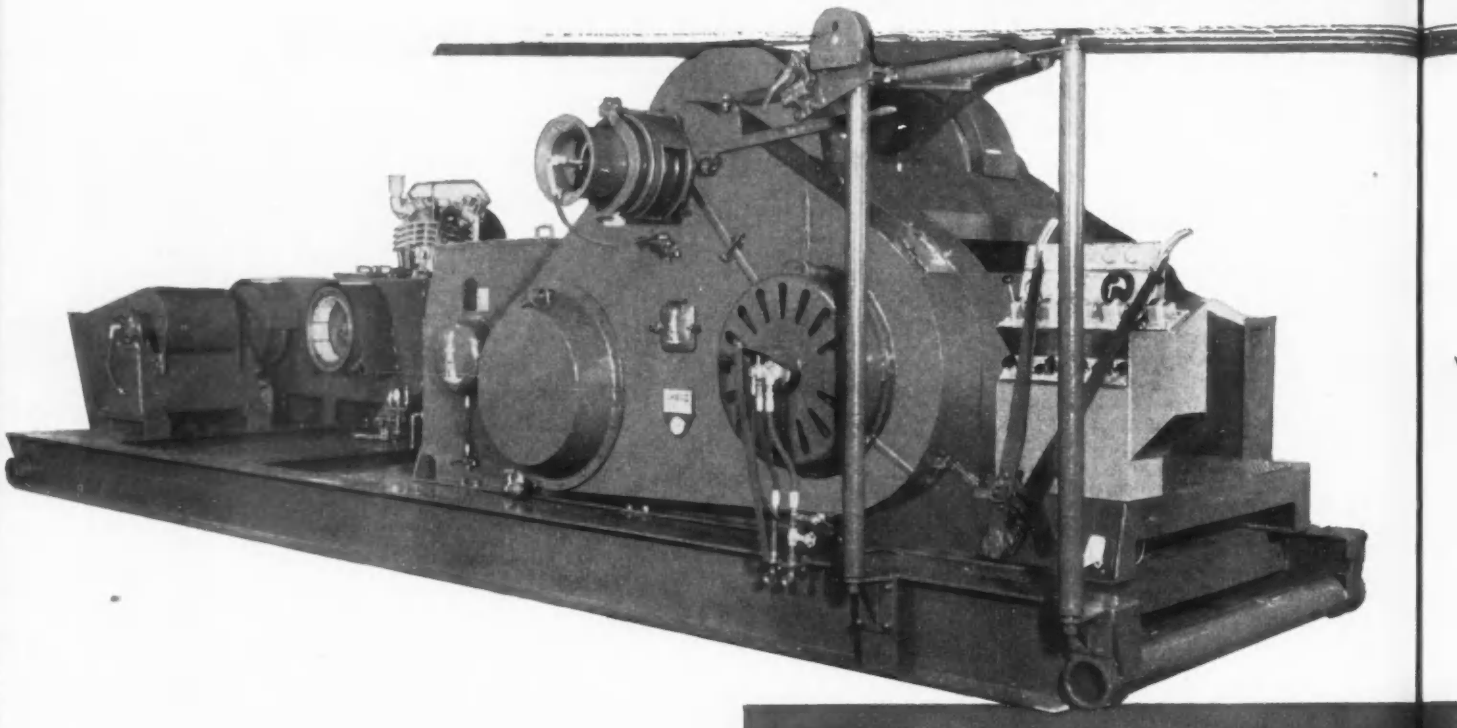
# INTRODUCING...



## SMOOTHER OPERATING... STURDIER...MORE FLEXIBLE

The new GC-500 is a greatly improved drilling rig. Like the line of G Series rigs from which it has been developed, the GC-500 is completely packaged and completely portable... with these new features:

**New** — BIGGER DRUM
(Longer drum length and larger spool diameter)

**New** — HEAVIER COMPOUNDING TRANSMISSION

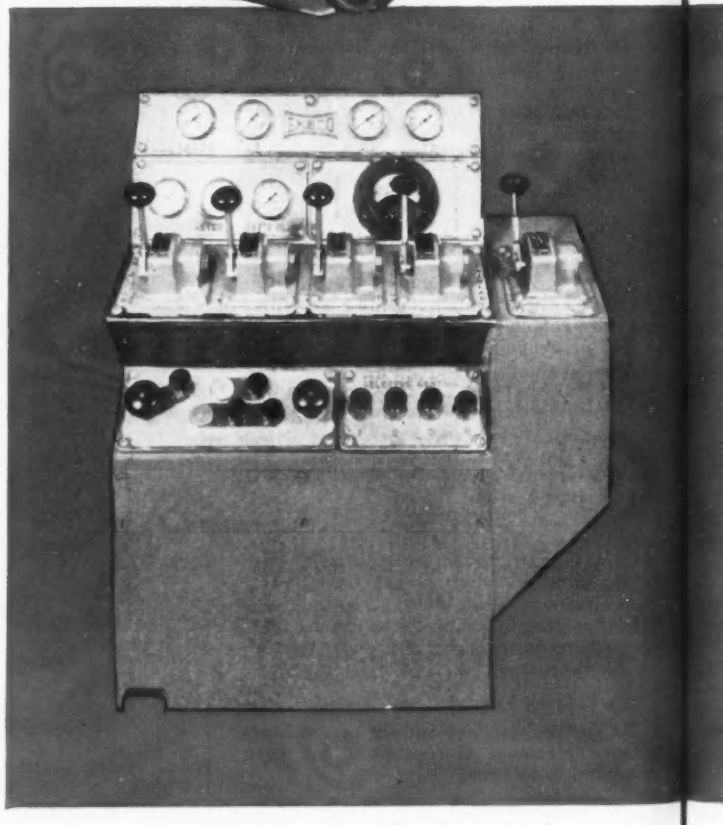
**New** — AIR-CONTROLLED HIGH AND LOW FRICTION CLUTCHES

**New** — LARGER CAPACITY BRAKES

**New** — OPTIONAL DOUBLE PUMP DRIVE
(For simplified stand-by pump operation)

In the GC-500, the drawworks — with built-in selective speed transmission — and compounding transmission are mounted on a common skid and can be transported as a unit. It is never necessary in tearing down or rigging up to break chains, oil lines or air lines. The result is a substantial reduction in hole-to-hole downtime.

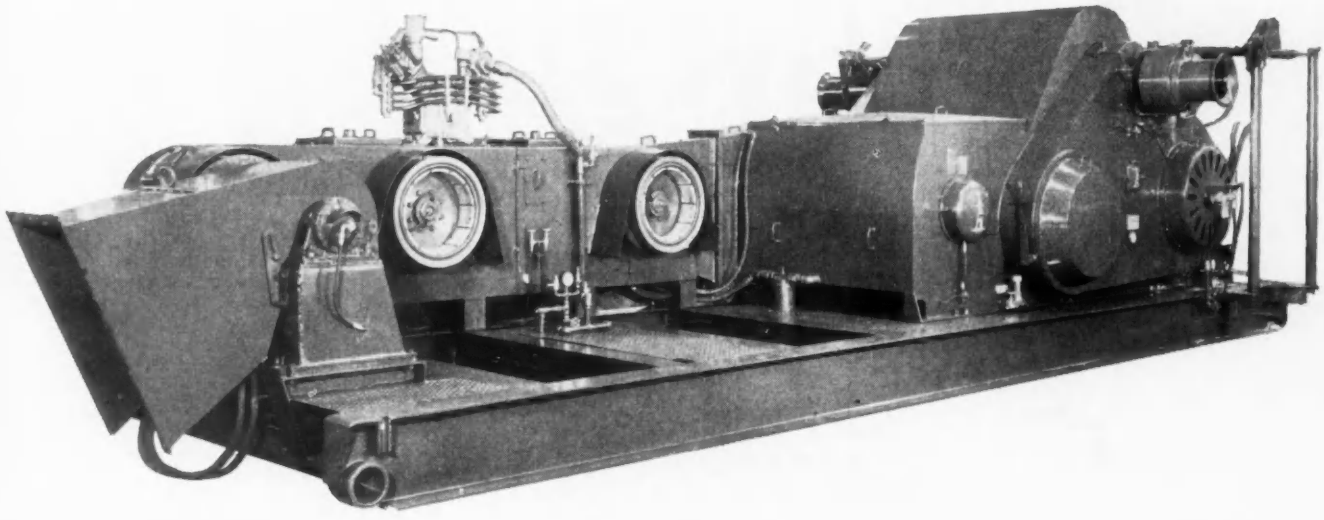
The high and low drum friction clutches, as well as all other friction clutches of the GC-500, are located on the outboard ends of the shafts for faster, easier servicing. The new rig is the sturdiest, smoothest running "500" rig produced by Emsco. It is available with fluid or mechanical power drives.



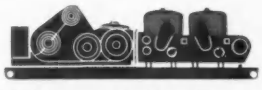
**FORWARD-MOUNTED DRILLER'S CONSOLE**
All gauges, operating valves and push-button controls are mounted in a separate console positioned forward of the drawworks, assuring the driller full view of the floor and derrick operations.

*ENGINEERED AND BUILT BY EMSCO—SOLD BY CONTINENTAL*

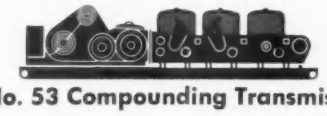
# G...the new Emsco "500"-GC model



## CHOICE OF ENGINES AND CHOICE OF COMPOUNDING TRANSMISSIONS



**No. 52 Compounding Transmission**



**No. 53 Compounding Transmission**

The heavier compounding transmission of the GC-500 provides maximum flexibility in the types of engines used. For instance, with the new transmission it is now possible to use two engines each with a 300 h.p. rating at 900 to 1200 r.p.m., or three engines each with a 200 h.p. rating at 900 to 1200 r.p.m.

This permits the operator a wide selection in the engines used, and assures that adequate horsepower will be available to meet his hoisting and pumping requirements.

## SPECIAL FEATURES OF NEW GC-500

- Chains and bearings of the drawworks, selective speed and compounding transmissions are lubricated by an automotive-type pressure lubrication system. This eliminates costly "oil up" downtime.
- All drawworks friction clutches are located on the outboard ends of shafts.
- Clean design permits the entire unit to be cradled into the substructure.
- Rig is available with two or three-engine compounding transmission.
- Removing and installing engines is made simple and fast.
- Emsco auxiliary brake package, dynamatic or hydromatic, is optional.
- Optional auxiliary drives are provided for generator, washdown pump, etc.
- Built-in sand reel is optional.

Call CONTINENTAL for detailed information about Emsco's new GC-500 . . . designed for dependable, low-cost operation.

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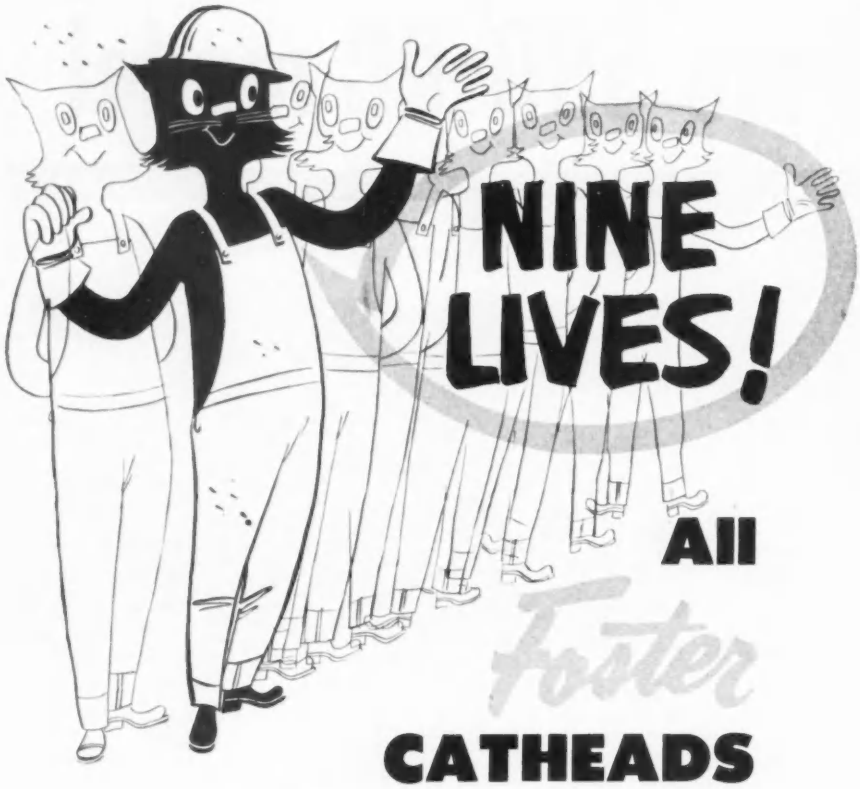

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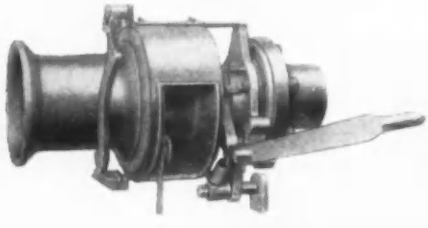
All Foster CATHEADS have that and more!

Foster Catheads are famous throughout the industry for their long service. Many of them have been in operation on well after well for years without repairs of any kind. Heavy duty anti-friction bearings, ample lubrication, low pressure per square inch of clutch face, make this long life, repair-free service possible.

With Foster Spinning Catheads there's no need to hand wrap the spinning line; the line will not foul and wind up; and it can be stopped instantly by releasing the control.

For complete details of these two Foster Catheads see pages 1760 and 1762 of the Composite Catalog.

MIDGET SPINNING CATHEAD



SPINNING CATHEAD

PLUS FEATURES

Instant engagement without reducing lineshaft speed ● will spin and tong with forked line ● cannot engage accidentally.

★ OUR 25 YEARS OF EXPERIENCE ASSURE YOU YEARS OF SERVICE.

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Peck Sales & Service, Houston, Texas. Rotary Sales & Service, Ltd., Edmonton, Alberta, Canada
Woodco Sales & Service, Great Bend, Kansas. W. O. Nelson, Farmington, N. M.


# DEATHS

**Sam S. Caldwell**, executive vice president of the Louisiana-Arkansas Division, Mid-Continent Oil & Gas Association, died in a Shreveport, La., hospital August 14. Caldwell had retired as vice president of the association a few days before his death. Mayor of Shreveport for 12 years, Caldwell joined the association in 1946 at the end of his third term as mayor. Prior to that time Caldwell had been an independent oil operator and an employe in the Land department of the old Roxana Petroleum Co. and Gulf Oil Company.

Sam S. Caldwell

•

**Criss C. Christy**, 46, formerly of Bartlesville, Okla., and chief accountant for Cities Service Oil Company, died August 7 in Oklahoma City. Christy joined the company in 1925.

•

**H. R. Bennett**, vice president and director of the Union Producing Company of Shreveport, La. and director of the United Gas Pipe Line Company, died August 19 of a heart attack while playing golf in Shreveport.

•

**William Hall**, 75, of Tulsa, retired oil operator and one-time superintendent and manager of the Regal Oil and Gas Company, died August 11.

•

**O. C. Cash**, 61, of Tulsa, tax commissioner for Stanolind Oil and Gas Co., died August 15. Cash gained international recognition by establishing the Society for the Preservation and Encouragement of Barber Shop Quartet Singing in America 15 years ago.

•

**Clyde E. Greeson**, 63, of Tulsa, laboratory technician in the Engineering Research and Development department of Mid-Continent Petroleum Corporation, died August 15 at his home.

•

**W. S. Keim, Jr.**, manager of the Industrial Relations department of Lane-Wells Company since 1945, died September 1. Keim was a leader in industrial relations and personnel work in the oil tool industry. Prior to joining Lane-Wells, Keim was in similar capacities with other large industrial concerns in Los Angeles.

•

**Cedric K. Ferguson**, chairman of the AIME Junior Group, secretary of the Pacific Petroleum Chapter, and associate research engineer at California Research Corporation, died August 11.

•

**Enoch G. Todd**, 75, of Cleveland, Okla., pioneer independent oil man and former mayor of Cleveland, died August 19 at his home.

# Now Open

## New Mid-Continent Store
## Edmonton, Alberta, Canada

Now the Canadian Oil Industry is being offered Mid-Continent Supply Company's well known "Around the Clock, Around the World" service from a new, completely stocked, completely staffed field supply store at Edmonton, Alberta, Canada. This new store, which is now open and operating, along with our new Canadian Division offices at Calgary, assure the Canadian oil industry of Sure Service — Sure Supply.

EDMONTON STORE: SOUTH 104TH STREET

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**MID-CONTINENT Supply Company**

MID-CONTINENT BLDG. FORT WORTH, TEXAS

**THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY**

# OHIO OIL CO. RIG BREAKS WORLD DEPTH RECORD

BAKERSFIELD, CALIF.—The deepest oil well
the world is being drilled at The Ohio Oil C
County Land A 72-4, in the Paloma
rd well, which has alread
ark, is being drilled

Drilling below 20,600 feet, the rotary table of this National 125 is driven with independent power. Twin GMC 671 engines, equipped with a Twin Disc Model F Torque Converter, drive through an Oilwell Reduction Gear.

Oil observers closely watching the deep wildcat credit the Twin Disc Torque Converter, as key equipment in eliminating "twist-offs," for making possible this world depth record. "No rig," they contend, "should be without the Twin Disc Torque Converter."

Five Twin Disc Model EH Clutches are also on this rig: Two on twin clutch set-up to compound and C-250 pump; one from pump compound to C-250; one on tail pump drive to C-350 pump; and a Model EH Master Clutch.

***Twin Disc Torque Converters***

Throughout the oilfields, operators report cheaper, faster hole from Twin Disc Torque Converter-equipped rigs. Automatic multiplication (up-to-6 times) of engine torque through these fluid drives, matches load demands . . . results in less shock on engines, drives, chains, drill pipe . . . less downtime.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

TWIN DISC

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TULSA


**Marcel Schlumberger**, co-founder with his brother of the internationally known Schlumberger Well Surveying Corporation, died August 19 in France at the age of 69. A frequent visitor to the United States, Schlumberger was in Houston in May for the opening of the new $6 million Houston headquarters for the United States and Canada. At the time of his death Schlumberger was on the board of directors of the corporation. He served as president of the corporation after his brother's death in 1936 until after World War II, when he resigned to devote more time to research and new developments for the corporation.

Marcel Schlumberger

•

**Earle Winston Johnson**, president of General Geophysical Company of Houston, died August 11 while on a business trip to Jasper, Alberta, Canada. Johnson organized General Geophysical Company in 1935.

•

**F. S. Freeland**, 73, of Sperry, Okla., pioneer independent oil man, died August 18. He moved to Oklahoma in 1907 and was active in the state's early oil development.

•

**Fred L. Stock**, 77, of Tulsa, retired paymaster for Skelly Oil Company, died August 18.

•

**Kent K. Kimball**, 61, independent consulting geologist and executive secretary of the International Petroleum Exposition, died August 9. Kimball, who lived in Tulsa, was employed by the Mid-Kansas Oil and Gas Company five years and for the 101 Ranch oil interests for a short time before becoming a consultant.

•

**W. S. Biggs**, 73, of Tulsa, died August 3 in Tulsa. Biggs operated as an independent oilman in Oklahoma, Texas, Illinois and Mississippi.

•

**Charles H. Schoenfeld**, 86, pioneer Oklahoma oil operator, died June 25 at his home in Harrisonville, Mo. He was active in early oil development in the Bartlesville, Okla., area and retired from business in 1933.

•

**J. T. (Dick) Richards**, 65, retired chief geologist for the Oklahoma City office of the Gulf Oil Corporation, died June 29 at his home in Orlando, Fla. Richards who retired in May, 1952, was prominent in geology in early days of oil development in Oklahoma and was associated with the former Gypsy Oil Company before it was absorbed by Gulf in 1929.

•

**P. J. Erickson, Jr.**, 41, vice president and chief engineer of the Arkansas-Louisiana Gas Company, died September 4 at his home in Shreveport, La. Erickson was elected vice-president and chief engineer for the gas company last April at the time of the separation of that company from the Arkansas Natural Gas Corporation.

F. H. (Ham) Isaacks, Cameron Division Sales Manager in the New Iberia, Louisiana, District

# WEEKS ISLAND IS STRONG FOR LIFT-PLUG VALVES

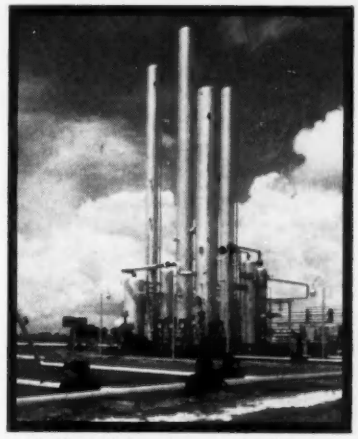
The extremely deep, high-pressure fields of South Louisiana have proven again the superiority of Cameron Non-Lubricated Lift-Plug Valves. In Weeks Island, South Lewisburg, and surrounding fields, extensive use is made of Cameron Lift-Plug Valves in Christmas tree manifolds as well as gathering and separator systems. They require no lubrication maintenance — they are easy to repair without removal from the line — they seal tightly and operate easily under full rated pressures. Obviously a continuous saving in man-hours and money is the result.

Try these great valves in your operations and see why **Weeks Island Is Strong For Lift-Plug Valves!**

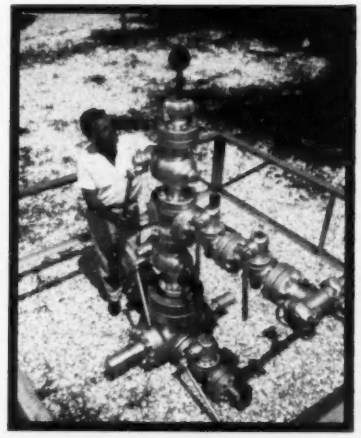
**CAMERON IRON WORKS, INCORPORATED**

P. O. BOX 1212 HOUSTON, TEXAS

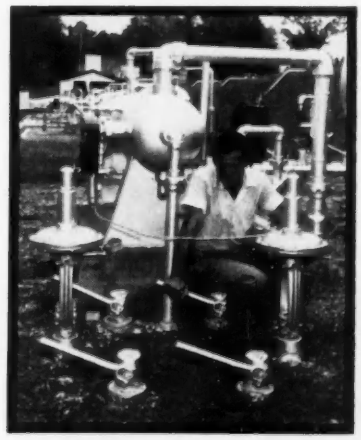
Export Office: 7912 Empire State Bldg., New York City



Lift-Plug Valves in a natural gasoline plant in the South Lewisburg field.



One of hundreds of high-pressure Christmas tree manifolds in Southern Louisiana fields utilizing Cameron Lift-Plug Valves.



Partially buried Lift-Plug Valves on a high-pressure manifold, attest to the trouble-free service provided by these fine valves.

*Cameron*

**NON-LUBRICATED**

**LIFT-PLUG VALVES**

# What's Happening

## AMONG INDUSTRY ASSOCIATIONS

### LPG Association Appoints Coleman District Secretary

Carol E. Coleman has been appointed district secretary in charge of the central states district office of the Liquefied Petroleum Gas Association. Coleman succeeds Robert C. Tanner, who resigned July 1 to join the O. A. Sutton Corp.

Coleman, whose headquarters will be in the Kaufman Building, Wichita, served as a sales representative for American Agricultural Chemical Company; later managed the Simonsen Propane Service, Quimby, Iowa; and sold furnaces and air conditioning equipment for the Johnson Tin Shop, Cherokee, Iowa.


Facts you should know about—

cutting your seismic bit costs

Profit-conscious shot hole drillers are finding more and more every day that they DO get maximum production at minimum bit costs with Hawthorne "Blue Demon" Bits . . . cutting their bit costs in half in many cases, even lower in others.

Many operators, after making their own comparative performance tests between "Blue Demons" and seismic bits formerly used, have standardized on Hawthorne "Blue Demons" immediately . . . after finding "Blue Demons" definitely superior and more economical to use than former types.

Custom built to give cleaner, straighter hole faster, in 90% of all formations, the "Blue Demon's" drilling performance has no equal, regardless of price. Set after set, box after box, you're getting proven drilling perfection.

Check your exploration drilling costs regularly, and cut them with "Blue Demons."

U. S. PATENT 2,615,684 OTHERS PENDING

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HERB J. HAWTHORNE INC.

P. O. BOX 7366, HOUSTON 8, TEXAS

YOU KNOW YOU GET MORE AND FASTER FOOTAGE FOR LESS WHEN YOU BUY "BLUE DEMONS"


### Special Transportation Planned for API Delegates

Getting to and from the annual API convention in Chicago this year should be no problem for delegates, with airline and railway companies pitching in to move large crowds in and out quickly.

Two all-streamlined special trains will run to Chicago from Houston and Tulsa by The Atchison, Topeka and Santa Fe Railway Company for the sixth consecutive year.

From Houston, the round-trip schedule is: Leave Houston—Saturday, November 7, 3 p.m.; Arrive Chicago—Sunday, November 8, 4 p.m.; Leave Chicago—Thursday, November 12, 3 p.m.; Arrive Houston—Friday, November 13, 4 p.m.

This year the special train will operate on a 25-hour schedule, one hour less than the last two years.

From Tulsa, the round-trip schedule is: Leave Tulsa—Sunday, November 8, 5 p.m.; Arrive Chicago—Monday, November 9, 8 a.m.; Leave Chicago—Thursday, November 12, 4:30 p.m.; Arrive Tulsa—Friday, November 13, 7:30 a.m.

In Los Angeles, many are making reservations on Santa Fe's Super Chief, which leaves Los Angeles Friday, November 6 at 8 p.m. and arrives in Chicago Sunday, November 8 at 1:45 p.m.

For the air-minded, Delta-Chicago and Southern Air Lines, Inc., will have, in addition to four regularly scheduled flights from Houston to Chicago, an "API Special" leaving Houston at 5:25 p.m. and arriving at Chicago at 9:59 p.m. It also has three flights daily out of Tulsa.

Braniff Airways, Inc., has six regularly scheduled flights from Houston to Chicago each day, and two leaving from Dallas.

From Los Angeles, three airlines have 29 flights daily to Chicago, and from New York, three airlines have 38 flights daily to the convention city.

### San Antonio Woman Heads Desk and Derrick Clubs

Irene Stimson Cox of San Antonio, Texas, was elected president of the Association of Desk and Derrick Clubs of North America at the second annual convention in Denver, Colo. Mrs. Cox holds the position of secretary, treasurer and director of the Panhandle Producing Company and is a partner in the firm of Cox and Compton. She has been serving Desk and Derrick as first vice president.

Other officers named for the year 1954 are Meitzie A. Palmer, Los Angeles, first vice-president; Sybil Sureck, Oklahoma City, second vice president; Lorene Porter, San Antonio, secretary; and Angela Cross, Pittsburgh, treasurer.

Elected directors for the seven regions of the association were Elinore McAdam, Newark, region I; Elouise Norris, Oklahoma City, region II; Bea Freyou, Baton Rouge, region III; Minetta Miller, Denver, region IV; Lydia Babka, San Francisco, region V; Dorothy Kassell, Fort Worth, region VI; and Betty Heaton, Edmonton, Canada, region VII.

## AGA Annual Convention To Be Held in St. Louis

Highlights of the thirty-fifth annual convention of the American Gas Association in St. Louis, Mo., from October 26-28, will be the discussion of Federal Power Commission activities relating to the natural gas industry and gas distributing companies. In a general session address entitled, "Five Months as Chairman of the Federal Power Commission," Jerome K. Kuykendall, FPC chairman, will discuss current commission problems pertaining to the natural gas industry and the relation of these problems to the gas distributing companies.

A talk, " 'States' Rights'—Its Privileges and Responsibilities," will be given by Eugene S. Loughlin, president of the National Association of Railroad and Utilities Commissioners and chairman of the Connecticut Public Utilities Commission. Latest word on the gas fuel front will be presented by Frank C. Smith, president of both the AGA and Houston Natural Gas Corporation, Houston, Texas.

Experts also will review accident and health insurance, public relations, promotion, natural gas pipe line operation and maintenance, government controls, and other industry matters.

## Mid-Continent Section ASME Elects Officers

R. P. Lennart, Service Pipe Line Company, has been named chairman of the Mid-Continent Section of the American Society of Mechanical Engineers.

Other officers are Carroll M. Leonard, Oklahoma A & M College, vice chairman; Lowell E. Anderson, Service Pipe Line Company, secretary; Carl A. Stevens, Oklahoma Institute of Technology, Stillwater and Tulsa, treasurer; C. O. Raines, Phillips Petroleum Company, Bartlesville, vice chairman — programs; Frank S. Hamlin, Phillips Petroleum Company, Bartlesville, vice chairman—membership; L. W. Ledgerwood, The Carter Oil Company, Tulsa, vice chairman—student membership; and J. A. Wilson, L. D. McKay Co., Tulsa, publicity chairman.

## Desk and Derrick Club Of Houston Names Officers

Officers of the Houston Desk and Derrick Club elected recently will be formally installed in October to serve for the 1953-54 term.

Named to office were Mrs. Bernice Collis, who is associated with Jack W. Frazier, president. Other officers are Mrs. Audrey Stoker, Houston Slush Pump Repair Company, first vice president; Mrs. Leah Vinson, Gulf Oil Corporation, second vice president; Miss Ida Brigham, Humble Oil & Refining Company, corresponding secretary; Miss Tillie Odom, Ginther, Warren & Ginther, recording secretary; and Miss Ruth Hunter, Houston Production Company, treasurer. Directors are Miss Agnes McClelland, Pan-American Production Co.; Miss Pat Rourke, Drilling Specialties Company; Miss Lois Johnston, Gulf Oil Corporation; and Miss Louise Phillips, The Texas Company.

The following members, elected in 1952, are serving their second year as directors and will complete the slate of officers: Miss Louise Sherrill, Brewster-Bartle Drilling Co.; Mrs. Lucille Englebert, P L D Well Service; Mrs. Helen Guerin, Humble Oil & Refining Company; and Miss Jeanne Smith, John S. Neilson.

The vise that's a handy portable workbench

RIDGID

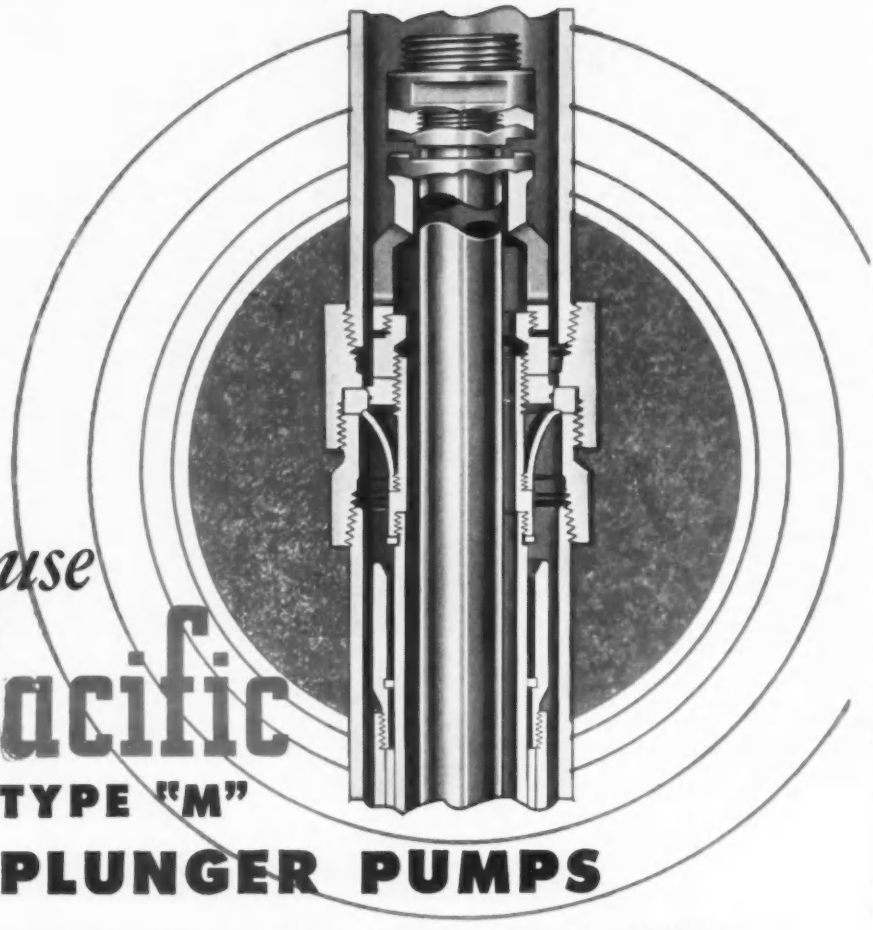
New No. 40 Tristand Pipe Vise

Easily taken to the job—legs fold in and chain for carrying, tray quickly on and off. Roomy top has pipe rest and efficient benders; tray keeps tools handy—and also makes Tristand extra rigid, won't fold up in use! Tool-steel Longrip jaws—firm grip but easy on polished pipe and tubing. Yoke No. 40, (old TSY-2½) 2½"; chain No. 45 (old TSC-4) 4". Buy these handy worksavers at your Supply House.

THE RIDGE TOOL COMPANY • ELYRIA, OHIO • U. S. A.

RIDGID
Work-Saver Pipe Tools

*Want Production from sandy holes?...*



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**TYPE "M"**

**PLUNGER PUMPS**

**WITH PATENTED* TOP LOCK AND VALVELESS PLUNGER**

Now you can use a "macaroni string" pumping installation without hollow sucker rods in problem wells of any depth. With the new Pacific Type "M" insert oil well pump, sand and abrasives *are sealed out above the pump end* by means of a fluid well; thus plunger and liners are fully protected. With the valveless plunger assembly the plunger acts as a "macaroni string" in the pump and the tubing *above* the seal functions as a "macaroni string" *above* the pump. Pacific Type "M" Plunger Pumps meet all API standards.

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**Send for New Bulletin 120...**

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DW-9

# Companies

## IN THE NEWS

**STANDARD-VACUUM OIL COMPANY** has purchased a 55-acre tract in Harrison, N.Y., fronting on Westchester Avenue as a site for a new headquarters office building in the United States. The company, now housed in three separate locations in downtown Manhattan, is planning the immediate construction of a suburban-type office structure to accommodate approximately 700 persons and is to be ready for occupancy in 1955.

•

**STANLEY J. LAKE OIL PROPERTIES, GOOD-LAKE OIL COMPANY,** and **JONES LAKE EXPLORATION COMPANY** have moved offices from Glendive, Mont., to 7 North 33rd Street, Billings, Mont. These companies deal in oil properties of all types, drilling and producing of wells, oil and gas mineral rights, leases, royalties, and working interest.

•

**SUNRAY OIL CORPORATION** has announced plans to incorporate a new unitization project division into its Reservoir Engineering department. W. L. Horner, vice president-manager of the department, will have charge of coordinating the formation of pool-wide conservation units. The centralized direction of this work in this department is expected to enable the company to proceed rapidly with several proposed major secondary recovery and unitization projects. These conservation programs involve waterflooding, pressure regulation and injection, cycling, etc.

•

**MEREDITH, CLEGG & HUNT** have announced the change in name of the corporation to CLEGG & HUNT. The firm will continue contract drilling with heavy and medium power and steam rigs in the Texas and Louisiana Gulf Coast. Offices are at 1973 West Gray, Houston.

•

**ARROW DRILLING COMPANY AND ARROW DRILLING COMPANY OF TEXAS** have announced the reactivation of operations in the Rocky Mountain area. James Parker, former manager of the West Texas and New Mexico District, is being transferred to that area as manager. Louis Roark, former assistant manager of East Texas, Arkansas, Louisiana and Mississippi area, replaces Parker.

•

**VAUGHN & TAYLOR CONSTRUCTION CO., INC.,** pipe line contractors, formerly of Wichita Falls, has announced the removal of its general headquarters to Odessa, Texas. Their location in Odessa is 2103 North Grant.

•

**SOCONY-VACUUM OIL COMPANY, INC.,** has announced details of the construction of a new four-story office building in Billings, Mont. The building will serve as headquarters for Socony-Vacuum production and exploration activities in the Williston Basin, the northern part of the Rocky Mountain states and western Canada. Construction will start this fall and the building will be ready for occupancy early in 1954.

# What's Happening

## AMONG SERVICE AND SUPPLY MEN

J. T. (Tommy) Tucker

Earl Kirberger

Ray Loudenback

Roy Smithey

### Unit Rig and Equipment Appoints Tucker General Sales Manager

J. T. (Tommy) Tucker, until recently general manager of sales of Emsco Manufacturing Company, has joined Unit Rig and Equipment Company, Tulsa, as general manager of sales. Tucker will make his headquarters in Tulsa.

Tucker joined Emsco in 1940, first as a field service man and later as sales manager of the Mid-Continent operations with headquarters in Houston.

Working with Tucker will be Ray Loudenback, who has been associated with Unit Rig since 1937. He will represent the company in Texas and other Gulf Coast states. Earl Kirberger, formerly with Franks Manufacturing Company, and in Unit Rig's Sales and Service department since 1940, will be northern division sales manager working out of the Tulsa office. Also in the Tulsa office serving as manager of Sales Order department will be Roy Smithey, who joined Unit Rig in 1949 after several years with National Supply Company.

### J. B. Beaird Company Names Russell to Post

Carlyle E. Russell has been appointed manager of the machining division of The J. B. Beaird Company, Inc., of Shreveport, La.

He will have supervision over ordnance shell production and the Machining and Maintenance departments at Beaird. Russell was formerly assistant general manager of the Turner Brass Works in Sycamore, Ill., for three years, being in charge of all production, estimating and tooling. Prior to that he held various positions in production departments of Midwestern manufacturing companies.

### Bosley Named Branch Manager Of Owens-Corning Fiberglas

Owens-Corning Fiberglas Corporation has appointed Samuel E. Bosley, for five years the company's Tulsa branch manager, as petroleum industry specialist.

Bosley will serve the petroleum industry in applying his knowledge of the application of Fiberglas products to problems of corrosion, filtration, heat control and other processes. He will maintain his residence in Tulsa at 2947 East 22nd Street, but will be available to designers and manufacturers of equipment used in the petroleum industry, as well as to contractors and operators of production, pipe line, refinery and marketing facilities in Northern Texas, Louisiana and Oklahoma.

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ARCCO... NOW
OFFERS
8 DAY
CHARTS
and
ROCKWELL CHART DRIVES
EIGHT-DAY ARCCO CHARTS are now available for use on practically all Rockwell-Emco, Foxboro and Westcott orifice meters. Eight day charts for other instruments soon available.
With this NEW Chart Drive 11 rotation speeds are possible. Turrets are available for 2, 3, 4, 6, 8 and 12 hours, also for 2, 3, 7 and 8 day rotation. Standard hub gives 24 hour rotation.
ROCKWELL CHART DRIVES are ruggedly built and are sealed for years of trouble-free service. The drives are adaptable to practically every type of instrument using circular charts. The price is $13.75 each. Turrets are $4.25 each F.O.B. Los Angeles, Calif. or Tulsa, Oklahoma.
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RECORDING CHART CO.
3113 E. 11th St. • Los Angeles 23, Calif.
SEND FOR DRIVE AND CHART BULLETIN
Send for Bulletin No. 104R

The NEW Protek CENTRIFUGE

HIGH SPEED
ACCURATE
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Aluminum alloy castings . . . high strength, light weight. Worm gear drive . . . easier turning, longer gear life. Drive gear of finest bronze. Bearing-supported shafts for proper alignment. Self-lubricated bearings . . . no maintenance necessary. NOW available: Model 152 for 2-15 ml tubes. Model 1002 for 2-100 ml tubes.

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550
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LOW FRICTION

Are hot holes, slant holes or tough digging causing galling and hard "break out" of drill pipe? Specify JET-LUBE 550 with low friction, non-melting, water-resistant features. Micro-ground moly-disulphide in silica base grease gets the job done. Batch controlled. Guaranteed.

*Order through your supply store or send for complete details*

JET-LUBE INC.

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## Beaumont Iron Works Names West Texas Representative

O. C. Sloan has been named West Texas representative for Beaumont Iron Works Company. His headquarters will be in Odessa.

O. C. Sloan

Sloan has been active in oil field sales and service in West Texas and New Mexico for the last six and a half years. Previously he was in the Gas Lift and Production Equipment department of Wilson Supply Company in Monohans, Texas, and handled production and drilling equipment for Texas Iron Works in Odessa.

## Jones & Laughlin Steel Makes Appointments in Canada

Recent changes in personnel affecting Canadian operations have been announced by the Jones & Laughlin Steel Corporation, Supply Division, Tulsa, Okla.

Preston V. Edwards, formerly of Williston, N. D., is now assistant manager of Canadian Operations with headquarters at 415 Lancaster Building, Calgary, Alberta. Ivor K. Thomas, a former employe of this company, has rejoined the Jones & Laughlin organization as a special assistant credit manager with headquarters also at Calgary.

Edwards originally entered the employ of the J & L organization at Hutchinson, Kansas, in 1941, and with the exception of two years in military service, he has been continuously employed by this company in several Kansas assignments and, more recently, as representative in the Williston Basin area.

Thomas has been a resident of Calgary for five years, having been employed by another supply company. A native of Pittsburgh, Thomas has spent his entire working life in the oil field supply business as a credit department representative.

## Avondale Marine Ways Announces New Plant Plans

The Avondale Marine Ways Inc., has under construction a large capacity plant and facilities for the manufacture of porcelain enamel architectural products. These will include load bearing walls, loadspan roofdecks and other products new to the building industry. The plant is being constructed adjacent to the main operation of the Avondale Corporation at Avondale, La.

The new plant will operate as a division of Avondale Marine Ways Inc., and the facilities will include sheet metal fabrication, pickling for treatment of the steel prior to enameling, automatic spray machines for applying the material, a large continuous furnace for fusing the enamel to the steel and ball mills in which the enamel will be prepared. The initial investment for this new addition to the Avondale facilities will represent almost a half million dollars and is to be ready for operation in early 1954.

The new division will be under the management of Ben F. Birdwell and the technical and production operations will be under the direction of Paul Kates.


"FOR WANT OF A NAIL . . ."

Kingdoms have been lost because of the lack of minute, special equipment at a critical time.

And so it can be in your business; packings or piston rings that do a specialized job can make the difference between maximum equipment performance or shut downs.

Let our engineers study your packing or piston ring problem and then recommend the right products for your needs.

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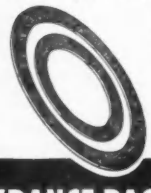

- Metallic Packings
- Power Piston Rings
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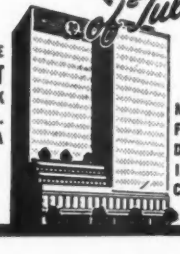
and in the Oil Business — It's both Pleasant and Profitable to . . .

"Think... FIRST"

An Oil Bank . . . directed by Oil Men in the oil capitol of the World.

1st of Tulsa



THE FIRST NATIONAL BANK AND TRUST CO. OF TULSA

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

John Bourdeau

Dillard R. Thomas

## Reed Roller Bit Company Promotes Three Engineers

John E. Bourdeau has been named division field engineer for the Reed Roller Bit Company and is now responsible for company field engineering activities in the West Texas area. Bourdeau's territory covers Midland, Odessa, San Angelo and Lubbock, as well as Hobbs, N. M.

A graduate of the University of Texas with a degree in mechanical engineering, Bourdeau has been with Reed's Engineering department since 1947 and prior to his present appointment served as field engineer at Houma, La. He replaces Sterling Marshall, who returned to Houston headquarters to assume the duties of product engineer for Reed.

Reed's new division field engineer at Houma will be Dillard R. Thomas who will act as company laison with drillers in that area. Thomas received his degree in mechanical engineering at the Rice Institute in Houston.

## Westinghouse Air Brake Has New Vice President—Finance

Alexander T. Daignault joined Westinghouse Air Brake Company on September 1, in the newly-created office of vice president—finance. Daignault will resign as treasurer and a director of Dewey and Almy Chemical Company of Cambridge, Mass.

Daignault, 37, a native of Woonsocket, R. I., is a graduate of Yale University and the Harvard Graduate School of Business Administration. During the last war, he served from 1941 to 1945 as assistant to the chief of the Research and Development branch of the Army's Quarter Master General's office.

From 1939 to 1941, Daignault was a member of the Industrial Engineering department of the United States Rubber Company. He joined Dewey and Almy in 1946 as Assistant to the President, became treasurer in 1948, and a director in 1952.

## Chain Belt Company Buys Shafer Bearing Corporation

Chain Belt Company announces the purchase of Shafer Bearing Corporation, Downers Grove, Ill., to broaden the markets for its power transmission products. The new addition will operate as the Shafer Bearing Division of Chain Belt Company.

No change is made in the management responsibility. R. P. Tennes, former president, becomes division manager; M. J. Tennes, Jr., factory manager; H. E. Tennes, sales manager; A. H. Williams, chief engineer; H. R. Lucas, controller, and Gordon Terris, director of distributor sales.

## Continental Supply Builds New Wyoming Headquarters

Construction has started on new Casper, Wyo., headquarters for The Continental Supply Company. A new building, located on Highway 20 at the east edge of Casper, will house the oil-field-supply company's store and warehouse, and district headquarters for their entire Rocky Mountain operations.

The building will be 225 feet by 90 feet in size. The front portion will be a two story brick building which will house the store on the first floor and the district offices on the second. The rear portion of the building will be a large steel warehouse.

In addition to the present construction, Continental has announced plans for a new store building in Williston, N. D., where they have operated since 1952. The store building used in the company's 1953 International Petroleum Exhibition in Tulsa, is being moved to Williston.

In addition to the Casper and Williston stores, Continental has in the Rocky Mountain area, stores in Newcastle and Cody, Wyo.; Cutbank and Glendive, Mont.; Artesia and Sterling, Colo.; and an office in Denver.

District manager in Casper is W. D. Craig, while other district officials are: R. G. Seim, credit manager; J. I. McQuiddy, assistant district manager; and A. P. Lacey, rotary equipment sales manager. G. H. Slack is manager of the Casper store.


RED DEVIL

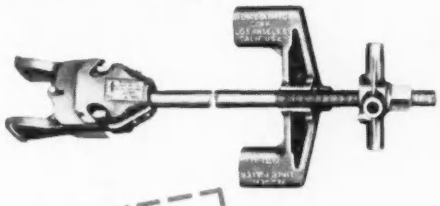
"DIA-HARD" Slush Pump Liners

*High Hardness and High Carbon The Combination for Longer Life*

Maximum wear resistance results from the combination of *high hardness* and *high carbon*, not from high hardness alone. The deep wear resistant case of Red Devil "Dia-Hard" liners has a uniform *hardness* of 62-64 Rockwell "C" and a uniform *high carbon* content in excess of 1.00%. This combination of a case of high hardness and abrasive resistant carbides with a core of high tensile strength and ductility is obtainable only by our special "Dia-Hard" process.

Integrally forged liner glands; precision honed bore. Outside dimensions are accurately machined assuring perfect working fits with liner packing assembly and pump cylinder for positive sealing against modern high pressure pump operation.

*Write for Price Catalog No. P-120.*



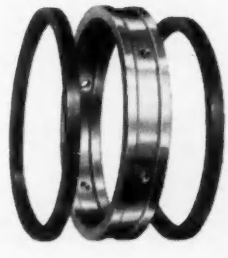
LINER PULLERS

The Red Devil Liner Puller is a strong, heavy duty tool capable of pulling the most obstinate liner. Simple in operation, there are no pins, connecting links or other small parts to bend, shear, break or lose. Two Types: "Universal Type" (as illustrated) for slush pumps, the "Expanding Grip Type" for pulling thin wall tube-type liners in small pumps. *Write for Price Catalog No. P-122.*

TELL-TALE LINER PACKING ASSEMBLIES

**Give warning before pump damage**

Tell-Tale Liner Packing Assembly consists of two "Dia-Tex" oil and heat resistant sealing rings separated by a precision machined corrosion-resistant steel lantern ring. Internal leakage is detected instantly through the tell-tale hole before costly fluid cuts can damage the slush pump. For information on Red Devil Tell-Tale Packing Assembly or "Dia-Tex" Liner Sealing Rings *write for Price Catalog No. P-121.*



***Consult Composite Catalog***

for full information on Red Devil Products or write for price catalogs. Red Devil Products are available through your supply store.

*Oil Well Manufacturing Corp.*

6008 S. Alameda Street, Los Angeles 1, California

from TARAWA to TEXAS— OKINAWA to OKLAHOMA !

MP straight centrifugal pumps have always been demanded for tough, exacting jobs. On beach-heads and in oil fields, MP pumps have proven they can take it.

- All Bronze Corrosion Resistant Construction.
- Continuous operation—wet or dry.
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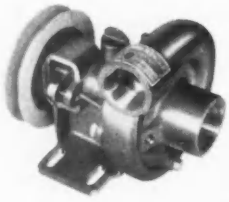

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Be sure the connections ARE LEAK PROOF!

*In LP Gas Underground Storage Tubing Strings*

Rectorseal has proved to be the only compound that assures leak-proof joints in LP Gas underground storage tubing strings. Rectorseal is your perfect sealant because it's sure, easy-to-use, economical.

It never hardens—never gets brittle. It's thin in the can but thickens in the joint to a plastic elasticity that assures a positive seal for the life of the connection. Make a test—try the best. There's no seal like Rectorseal. Ask for Rectorseal by name at your Supply Store. If they can't supply you, write

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RECTORSEAL
*Manufactured by*
RECTOR WELL EQUIPMENT CO., INC.
Fort Worth, Texas
MAKING THE OIL INDUSTRY SAFER

## Kinder To Handle Sales For Emsco Manufacturing

Appointment of William C. Kinder as vice president in charge of all Emsco Manufacturing Company sales has been announced.

William C. Kinder

For the past 12 years Kinder has been in charge of manufacturing and sales of the D&B Division of Emsco, and three years ago transferred from Los Angeles to Garland, Texas, upon the completion of the new D&B plant at Garland.

In his new position, Kinder will be responsible for the sale of all Emsco and D&B products, and in connection with oil field equipment sales will take over the duties of J. T. Tucker, general sales manager, who resigned.

## Black, Sivalls and Bryson Name Vice President

Chester A. Siver has been elected vice president and general manager of engineering by Black, Sivalls & Bryson, Inc.

Chester A. Siver

Siver joined the company early in the year as general manager of engineering, which includes engineering staffs in Kansas City, Oklahoma City and Tulsa. For many years Siver was associated with Linde-Air Products Company and was more recently manager—engineering of The Liquid Carbonic Corporation, Durable Goods Division, Chicago.

## Youngstown Sheet and Tube Names New General Manager

William H. Yeckley has been appointed to a new position of general manager of steel operations for The Youngstown Sheet and Tube Company. For the past three years Yeckley has been assistant to A. S. Glossbrenner, vice president—operations. Yeckley has been directing steel operations in Youngstown and Chicago districts.

Yeckley came to Youngstown in 1937 as test engineer and later received a series of promotions, moving him to various plants run by the company.

## Buckeye Supply To Handle Carter Pumping Units

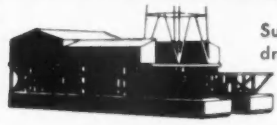
The Buckeye Supply Company will distribute Carter hydraulic pumping units in West Virginia.

S. C. Carter Co., Inc., Los Angeles, manufacturers of the Carter long-stroke hydraulic pumping unit, announces the appointment of The Buckeye Supply Company as distributors for the state of West Virginia.

The Buckeye Supply Company will handle sales and service of the Carter units from their head office at Zanesville and office at Vienna.

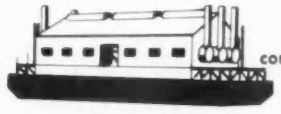
*Levingston*

BUILDS FINE SPECIALIZED MARINE EQUIPMENT FOR THE PETROLEUM INDUSTRY



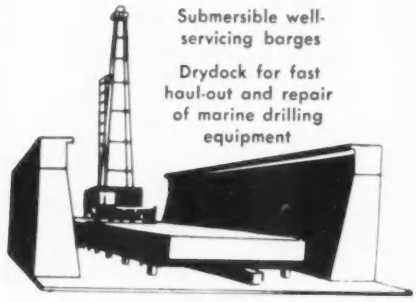
Submersible drilling barges

Tugs



Boiler and compressor barges

Water, oil, and supply barges



Submersible well-servicing barges

Drydock for fast haul-out and repair of marine drilling equipment

Levingston is not only located conveniently with respect to marine drilling operations on the Gulf Coast, but here you will find marine engineers and constructors who understand the language of oil operators. Bring your marine petroleum equipment problems to Levingston *first* for a quick economical solution.

*Levingston*
SHIPBUILDING CO.
Orange, Texas

Douglas M. Jones

Clayton E. Rose

### Three Promotions Announced By Axelson Manufacturing

Clayton E. Rose has been promoted to California sales manager and Dolph L. Witzel named assistant California sales manager of Axelson Manufacturing Company, division of Pressed Steel Car Company, Inc. A third appointment announced by the company is the promotion of Douglas M. Jones, formerly assistant chief engineer and technical consultant, to chief engineer.

Dolph L. Witzel

Jones succeeds Glynn H. Williams, who has been advanced to a special production engineering post.

Rose started with Axelson in 1935 in the company's Taft field store. Witzel joined the company the same year and Jones came with the firm in 1936.

### Gray Tool Company Names Canadian Distributors

The Gray Tool Company of Houston announced the appointment of the Mid-Continent Supply Company as the exclusive distributors for Gray swivels and swivel parts in Canada. The company further announced that the Mid-Continent Supply Company is now a fully authorized distributor in the United States for Gray swivels, and will maintain complete stocks of swivel parts.

### L. L. Garren Named Manager Of New Baash-Ross Plant

L. L. (Red) Garren has been appointed manager of the new manufacturing plant of Baash-Ross Tool Company nearing completion in Canton, Ohio.

L. L. Garren

Garren joined Baash-Ross in its Oklahoma City plant and progressed through various sales and administrative positions to district manager of the Baash-Ross West Texas-New Mexico operations headquartered in Odessa, Texas, the position he leaves to assume his duties as manager in Ohio. The Ohio plant is the newest in the chain of 18 plants and field shops serving major areas of the nation's oil industry.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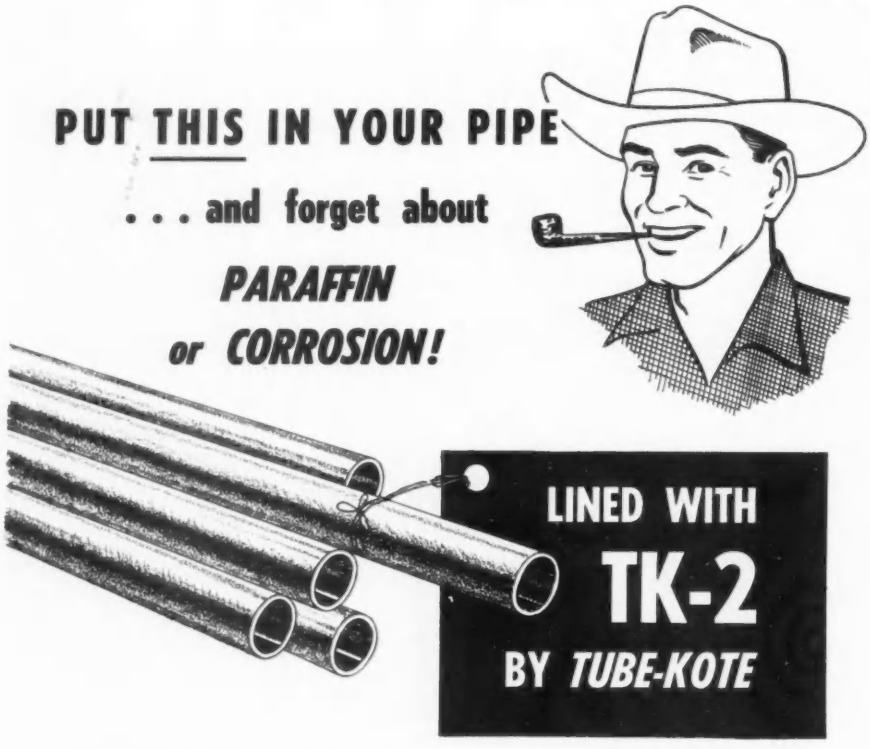


Dependable protection is the only kind worth having, and you can be sure of the paraffin and corrosion protection you have when your pipe is lined with TK-2, a plastic lining applied by Tube-Kote, Inc.

Paraffin just doesn't accumulate in producing wells lined with TK-2. It resists corrosion caused by sour crude, gas condensate, and many corrosive fluids.

**TK-2 has been field tested for ten years in seven million feet of oil country pipe.** It is the first choice of producers, pipe lines, drillers, refiners, chemical plants.

Have your pipe lined with TK-2 for wells on packer, high pressure wells, offshore or isolated wells, and wells with storm chokes. TK-2 is designed for tough problems . . . like yours!

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First Name In Corrosion Resistance
TUBE-KOTE T.M. Reg.


## New Coliseum To House Permian Basin Oil Show

The Permian Basin Oil Show has a new $600,000 home. Known as the Ector County Coliseum, the building will be located in Fair Park at Odessa, Texas.

The coliseum will provide one-third more space than existing facilities. Two buildings at the old county park location will be moved to the new site and improved. The new coliseum is to be built of masonry, concrete and steel. The building will be 288 feet long by 208 feet wide and the office and lobby space will project from the main building.

The building will have permanent bleachers, space for dressing rooms and rest rooms, and a stage. The Fair Park and coliseum will be completed in advance of the Permian Basin Oil Show of 1954.

## Gailus To Head Department Of Continental Supply Company

Joseph T. Gailus has been appointed manager, Tubular Division, The Continental Supply Company's Sales department in Dallas, Texas. Gailus, who since June 1948 has been manager of tubular sales for Continental's Kansas-Oklahoma Division, assumed his duties in Dallas on August 15.

Joseph T. Gailus

Gailus was transferred to The Continental Supply Company in August 1939 from The Youngstown Sheet and Tube Company where he had been assistant foreman of the seamless mill. Formerly he worked for Carnegie Illinois Steel Corporation.

## Ben F. Kelley Co. Appoints Wittich Export Representative

Appointment of Val R. Wittich, 30 Rockfeller Plaza, New York, as exclusive export representative for Ben F. Kelley Co., Inc., Tulsa, has been announced by Ben F. Kelley, president. The Tulsa concern manufactures KelCo air operated power slips, tubing tongs, breakout and spinning line catheads.

The Val R. Wittich organization will represent the Ben F. Kelley Co., Inc., and KelCo products in all international markets except Canada and Mexico.

## West Named Sales Manager Of Climax Engine and Pump

Carl G. Preis, president of Eversharp, Inc., announces the appointment of E. D. West as general sales manager of its Climax Engine and Pump Manufacturing Division, with headquarters in Chicago. West has been associated with Climax for 19 years as a sales executive.

Two additional appointments were also announced by Preis. Fred W. Neubauer, who has been with Climax for 35 years, has been appointed plant manager of its Climax Manufacturing Division located at Clinton, Iowa. Ted Skeen, district manager with headquarters in Dallas, Texas, will be in charge of sales and service throughout the midcontinent area.

J. T. Clements

Don Vandenburg

Ledford Smith

Harold Palmour

## Fluid Packed Pump Company Announces Staff Expansion

Fluid Packed Pump Company has announced that its expansion program and sales growth have necessitated promotions and additions to the sales staff.

J. T. Clements, formerly of Houston, has been promoted to division manager for the entire Rocky Mountain and Canadian territories operating out of Casper, Wyo. Verlan Lewis replaces Clements in Houston. Ledford Smith, formerly district representative at Wichita Falls, has been promoted to district manager of North Texas. Bill Duke has been added to the company's Kansas force and is stationed at Plainsville, Kansas. J. A. St. John, formerly of Bay Petroleum Company, and C. H. Emerick of California have been added to the West Texas sales staff and will work out of Odessa. George Nugent has joined the Gulf Coast Division with headquarters at Freer, Texas.

Gordon Satterla, assistant plant manager, has returned to the company's plant at Los Nietos after 18 months of sales work and D. H. Vandenburg, assistant plant manager, has joined the Odessa sales force. Harold Palmour, formerly division manager in Shreveport, La., has been transferred to Fort Worth to supervise the installation and operation of the oilmaster rod weight compensator, the oilmaster dual zone production tool and the field testing of other new oilmaster products.

## Grove Regulator Company Opens District Warehouse

Corpus Christi, Texas, is the site of a new district warehouse recently opened by Grove Regulator Company. J. D. Hicks, district manager, in charge of the new facilities, has announced appointment of C. J. Scott and D. M. Cooper to the staff.

Grove Regulator Company manufactures Seal-O-Ring gate valves, Flexflo valves and regulators, Chexflo valves, Powereactor and Mity-Mite regulators, and other fluid and gas control equipment. The new Corpus Christi warehouse, located at 4534 North Baldwin Blvd., will serve Grove equipment users throughout Southeastern Texas and surrounding areas.

## New Office Locations Set Up By Geophysical Service

Geophysical Service Inc. has established two new supervisory office locations in its Mid-Continent Division.

Gordon D. Cloepfil recently has moved to Billings, Mont., to supervise GSI seismograph field parties operating in the Division's northern area. He formerly was located at Minot, N. D.

R. H. Rainey has opened a GSI office in Midland, Texas, for supervision of GSI parties in West Texas. He was transferred to Midland from Calgary, Alberta, where he was field supervisor with Geophysical Service International Corporation.

GSI Mid-Continent division manager is Robert Dyk. Division headquarters are in Denver.

## James C. Westfall Receives United States Rubber Post

James C. Westfall has been named assistant to Ernest G. Brown, vice president and general manager, mechanical goods division, United States Rubber Company.

Westfall, formerly assistant superintendent of the Belting department in the company's Passaic plant, will be headquartered at 1230 Avenue of the Americas. A graduate of Princeton and the Harvard University School of Business Administration, he started with a Cleveland subsidiary of U. S. Rubber in 1929.

Westfall was later transferred to Passaic where he became manager of the Sales-Production Coordination department in 1935. He held this post until his transfer to the Belting department as assistant superintendent in 1947.


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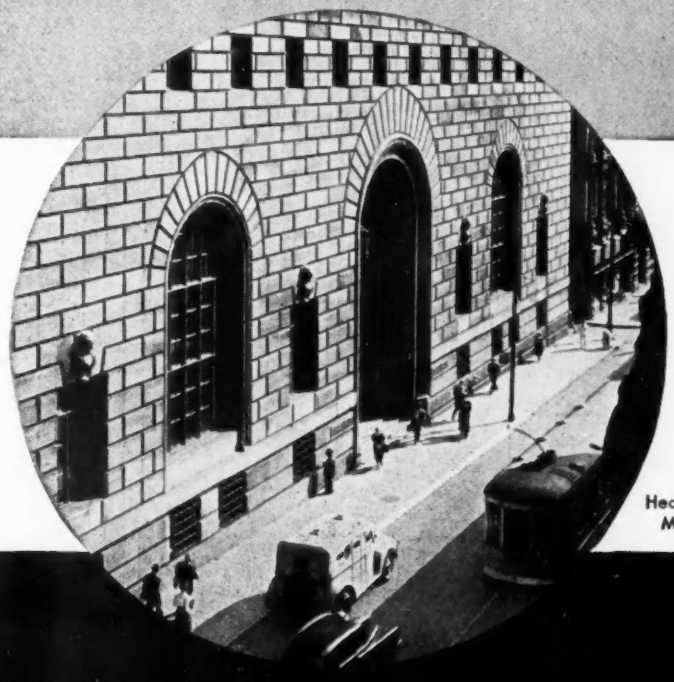

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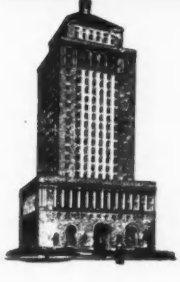

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*Total assets exceed $2,675,000,000*

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**EASY TO JOIN.** Republic Plastic Pipe installation costs are low because field joints are easily made. There are plastic fittings available for many types of piping arrangements, including adapters for joining plastic to steel. Semi-Rigid is joined by a solvent welded sleeve type fitting. Flexible joints are made using insert type fittings and stainless steel clamps.

# New PLASTIC PIPE

Republic Steel offers two new products that may solve some of your piping problems. They are Republic Semi-Rigid and Republic Flexible Plastic Pipe.

Semi-Rigid is made of butyrate, a material known for its high corrosion-resistance to petroleum products. You can use it for many kinds of flow lines including transmission of high paraffin crudes, sour crudes and salt water. You can also transmit low-pressure gas, sweet or sour.

Republic Flexible Plastic Pipe is made of polyethylene. Its oil field uses include water lines to drilling rigs and other cold water applications. It is not suitable for handling petroleum products.

Both of these plastic pipes have exceptionally smooth wall surfaces. This means a high rate of flow, reduced friction loss, low maintenance costs. Both are non-toxic. Both are lightweight. They're exceptionally easy to install. In-the-ground costs are surprisingly low.

Semi-Rigid is available in 9 sizes from ½″ to 6″. It comes in 20 and 40-foot straight lengths. It's available in coils in ½″, ¾″ and 1″ diameters. While normally supplied in black, clear pipe is available on request. Flexible also comes in 9 sizes, from ½″ to 6″. It's available in coils, in sizes ½″ through 3″ in diameter. In 4″ and 6″ diameters it is supplied in 25-foot lengths.

New Booklet No. 603 gives sizes, lengths, test pressures and other valuable information on Republic's new Semi-Rigid and Flexible Plastic Pipe. Write for it. It's Free.

Complete information on both of these new Republic Plastic Pipes is available in booklet No. 603. Write for it to:

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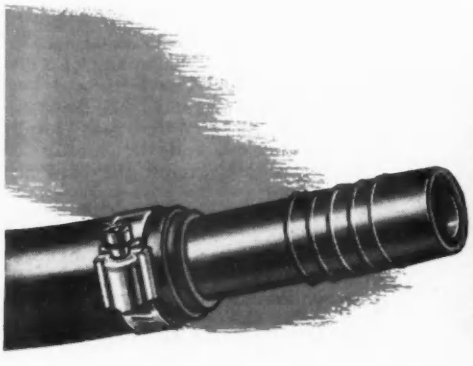

REPUBLIC STEEL

*Republic*
**PLASTIC PIPE**
**SEMI-RIGID AND FLEXIBLE**

## Associated Oil Field Rentals Names Ralph Neuhaus to Post

Ralph Neuhaus, industrial executive, has been named vice president and general manager of Associated Oil Field Rentals. Neuhaus' appointment was announced by David C. Bintliff, chairman of the board, who revealed that the properties and oil field rental business formerly operated under three separate companies, hereafter would be operated under the trade name of Associated Oil Field Rentals. The three companies under which they formerly operated were Associated Oil Field Rentals of Houston, Southwest Pipe Rentals of Oklahoma City and Drill Pipe Rentals of Odessa.

O. L. Dorroh is vice president—operating manager of the company. James A. Gray, Rex Hudson and Cecil DeArman will continue on the board of directors.

Offices and rental yards are located in Harvey, New Iberia and Shreveport, La.; Casper, Wyo.; Williston, N. D.; Lindsey, Duncan and Oklahoma City, Okla.; Hobbs, N. M.; and Odessa, Alice, Corpus Christi and Houston, Texas.

## Ray Kensel Named to Post With Cleco Air Tool Division

Ray Kensel has been named district sales manager for Cleco Air Tool Division of Reed Roller Bit Company for the Detroit, Cleveland, Cincinnati, and Indianapolis area, replacing B. O. Stoothoff, who has resigned.

Before his promotion, Kensel was a sales representative for Cleco in Fort Worth. Cleco Division of Reed Roller Bit Company manufactures a variety of portable air tools.

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Face it! . . . with Diamond Metal—tough, pure tungsten carbide that has the general properties of diamond.

Tool joints, drill collars, drilling bits, cutting tools, fishing tools, rotary shoes . . . will double and triple their down hole life, for faster operations and greater profits.

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Tough-hard Diamond Metal is recommended for every equipment surface receiving abrasion, stress, shock or impact.

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Frank John P. Z. Hilliard

## Executive Promotions Made By Mid-Continent Supply

Frank John has been named director of credits for Mid-Continent Supply Company and P. Z. Hilliard has been promoted to director of purchases for the company.

John's new duties were assumed on his return from Washington, D. C., where he headed Mid-Continent's office established there in 1951. In the newly-created post, John will be active in the correlation of sales and credit activities.

Hilliard served Mid-Continent as management coordinator in the Fort Worth offices prior to his promotion. Previously Hilliard was New Orleans district manager for the organization.

## Price Named Vice President Of Tuboscope Company

The appointment of B. G. Price to the position of vice president, engineering and research, for Tuboscope Company has been announced.

B. G. Price

Price joined Tuboscope in 1938, serving in field operations in Texas, Kansas, Illinois, Oklahoma and South America until 1947. Upon his return to Houston he assumed the position of equipment engineer and later took charge of Tuboscope's fleet and equipment maintenance, design and construction.

In his new capacity, Price will continue to act as equipment supervisor for the company and will be in charge of engineering and development on all equipment for the various services offered by Tuboscope.

## Tulsa Bank Buys Control Of Fifth and Boston Corporation

The purchase of 100 percent control of the Fifth and Boston Corporation—the First National Building—by the First National Bank and Trust Company of Tulsa has been announced. The Fifth and Boston Corporation operates the comparatively new building which was jointly owned by the bank and the Sunray Oil Corporation, whose interest the bank has now acquired.

The expansion was under discussion since announcement by Sunray of the erection of the new Sunray Building at Ninth and Cincinnati. Formerly the bank and Sunray shared ownership in the stock of the Building Corporation with the bank holding 55 percent and Sunray 45 percent interest. The building was completed in

1950 at a cost of $7 million.

Sunray offices will remain in the First National Building until completion of the new Sunray Building, expected to be ready for occupancy in the fall of 1954.

## Sprowls Receives Promotion From National Supply Company

Donald C. Sprowls has been appointed assistant division credit manager of The National Supply Company, Limited, Oil Field Division. He will make his headquarters in Calgary, Alberta, where he replaces Ivor K. Thomas, who has resigned.

Donald C. Sprowls

Prior to his present appointment, Sprowls was district credit representative at Edmonton, Alberta. He is being succeeded there by D. F. Copeland, Jr., who has been a senior credit clerk at The National Supply Company's office at Tulsa.

Sprowls is a graduate of the University of Pittsburgh. He came with National Supply in 1949 and was transferred to Calgary in 1951, prior to going to Edmonton.

## Ray Named Representative For Baash-Ross Tool Company

Thomas Ray, Jr. has been named sales representative of Baash-Ross Tool Company to handle the company's sales operations in northeastern Oklahoma and southern Kansas. Ray will have headquarters in Tulsa where he replaces P. R. Nagle, who was moved to New York as assistant manager of Baash-Ross export operations.

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**STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (Title 39, United States Code, Section 233) SHOWING THE OWNERSHIP, MANAGEMENT, AND CIRCULATION OF** WORLD OIL, published monthly at Houston, Texas, for October, 1953.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Ray L. Dudley, 3371 Chevy Chase, Houston, Texas; Editor, Warren L. Baker, 5324 Cherokee, Houston, Texas; Managing Editor, Al Reese, 9112 Westview, Houston, Texas; Business Manager, A. L. Burns, No. 7 Chelsea Place, Houston, Texas.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual member, must be given.) The Gulf Publishing Company, Houston, Texas; James Anderson, Houston, Texas; June Wooden Bliss, Houston, Texas; June Wooden Dudley Bliss—Trustee, Houston, Texas; A. L. Burns, Houston, Texas; Mrs. Grace C. Carter, Tulsa, Oklahoma; Mrs. Margaret D. Cashman, Houston, Texas; P. Stinson Dudley, Gainesville, Texas; Ray L. Dudley, Houston, Texas; Wm. G. Dudley, Houston, Texas; Wm. V. Gross, Utopia, Texas; Carolyn Dodson Keeble, Pecos, Texas; Mrs. Anita S. Lane, Houston, Texas; Charles H. Lane, Houston, Texas; James William Nelson, Baytown, Texas; Tom W. Nelson, Houston, Texas; J. Kent Ridley (Deceased), Houston, Texas; Walter Gage Sterling—Trustee, Houston, Texas; O. R. Waller, Chicago, Illinois; Mrs. Patricia McFarland Windham, Austin, Texas.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) M. D. Anderson Foundation, Houston, Texas.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required from daily, weekly, semiweekly, and triweekly newspapers only.)

A. L. BURNS, Business Manager.

Sworn to and subscribed before me this 10th day of September, 1953.

P. J. AUCOIN,

(Seal) Notary Public in and for Harris County, Texas.

(My commission expires June 1, 1955.)

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# WORLD OIL'S Trading Post
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**RATES: Regular Classified** (undisplayed) **set in this size type: 12 cents per word. Minimum charge, $3. Blind box address in our care counts six words. Replies forwarded without charge. Situation wanted** ads, 6 cents per word. **Display ads**, set in suitably larger type with ruled border, $12 per column inch; situation wanted display ads, $6 per column inch. Ten percent discount for two or more insertions of same copy in consecutive issues. **All classified ads payable in advance. COPY DEADLINE:** 5th of month preceding date of issue. Send copy and checks to: **Trading Post Section, World Oil, P. O. Box 2608, Houston, Texas.**

### HELP WANTED

**Geophysical Personnel**

Newly organized subsidiary of Standard Oil Company of California needs Party Chiefs, Computers, and trainees with educational background in geological and geophysical sciences.

Please write giving full particulars regarding personal, educational and experience qualifications or call for appointment interview.

**CHEVRON OIL COMPANY**
3800 West Alabama Houston 6, Texas
Telephone: MAdison-2305

### SITUATIONS WANTED

**Drilling contractor operating in West Texas and New Mexico desires to contact small or medium-sized independent oil company who needs an operating manager. Personal interview desired. Twenty years experience in all phases of the oil industry. Address replies to Box 94-W, WORLD OIL, Houston 1, Texas.**

Have five years management experience in fair size oil operation, including exploration, development, production, sale of oil, leases, contracts, etc. Have master's degree petroleum engineering and substantial geological experience. Desire position with small group or independent interested in oil exploration and production. Presently located Rocky Mountain area. Box 4-W, WORLD OIL, P. O. Box 2608, Houston, Texas.

■ PETROLEUM ENGINEER—B.S. Degree, 10 years experience in production, and reservoir engineering, 8 years with major oil company, 2 with small independent. Age 33. Desires position with either major or independent oil company anywhere in USA or Canada. Above-average academic and professional background. Complete resume upon request. Box 3-W, c/o WORLD OIL, Houston, Texas.

### EQUIPMENT WANTED

■ WANTED: Rotary rig, 4½" drill pipes, gas or diesel, for 3,000' drilling. Must be good condition, complete, ready to go. Also need hydraulic pipe pulling outfit. White Drilling Co., Box 213, Valier, Montana.

### LEASES & ROYALTIES

**OIL-RIDGE, ANDREWS COUNTY, TEXAS** Section 11, South ½ Section 10, Block 33. Lease direct from owner. Carl Alsobrook, 8153 Milredge, Houston, Texas. Phone OLive 1752.

### DECALS

TRUCK LETTERING AND TRADEMARK decals made for your trucks. Easy to apply, uniform, distinctive, economical for small or large needs. Write for Catalog. Mathews Company, 827 S. Harvey, Oak Park, Ill.

### BUSINESS OPPORTUNITIES

**WILLISTON BASIN ROYALTIES**

**Dealers in Montana royalties since 1921, we now specialize in royalties under major company leases in the Montana portion of the Williston Basin. For information on our method of operation, write LANDOWNERS ROYALTIES COMPANY, Box 1225, Great Falls, Montana.**

**GAS FINANCING**

We finance the installation of gathering systems, compressor stations, processing plants, etc. and purchase casinghead and natural gas.

Well owners are paid for their gas and also participate in operation.

Reply in confidence to:

*Box No. 5-W*

c/o WORLD OIL, Houston, Texas

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Our integrated services of personal search reporting, prepaid orders, and delivery follow-up often save you a month's costly delay in difficult, unsatisfactory correspondence with numerous gov't agencies on procurement of inexpensive stereo prints, mosaics, etc. U.S. air coverage divided among various agencies each operating separately. Fees quoted on your job based on work required. Original gov't. prepayment receipts furnished, prints shipped direct. Searches for ready-made foreign air photography also made. **Write Dept. WO1.**

**WASHINGTON COMMERCIAL CO.**
**1200 15th St. N.W., Washington 5, D.C.**

### FOR SALE

**ROTARY RIGS**
**For Sale By Owner**

Model "55" Failing, Truck Mounted. Truck or Drawworks motor available for hoisting power. Two section Mast with hydraulic lift and will stand doubles in derrick. Gardner-Denver Pump and Cummins Diesel Motor in one unit. Fuel Tanks, Oil House and Lite Plants on dual four wheel Trailer. Substructure. Appx. 2400' 3½" Drill Pipe.

Completely equipped for conventional contract drilling or may be stripped down for core drilling and day work.

Wilson Giant Drawworks with compound and Caterpillar Motors. Lee C. Moore Jacknife Derrick with Substructure. Gardner Denver Pump drilled two wells. Appx. 4200' 4½" Drill Pipe. American Tool House, New. Geologist Bunk House. Caterpillar Tractor.

These rigs are in full operating condition, having just completed wells and are not robbed of any material. Priced for quick sale. Write for itemized inventory. All inquiries answered. H. J. Uhl Drilling Co., Box 2336—North Station. Telephone Temple 83307, Wichita, Kansas.

**USED, EXCELLENT CONDITION, IN OPERATION**

On Each (4¾" to 1") (8⅝" to 2⅜") (13⅜" to 4½") LANDIS Leadscrew Receding Head Pipe Threading and Cutting Machine Motor Driven. OILFIELD SALVAGE CO., INC. Phone CHarter 6914, P. O. Box 2589, Houston, Texas.

■ FOR SALE: Rambler H-40, IDECO with sub structure. Trailer mounted. C 350 Ideal and 7½ x 14 BA Emsco Pumps. Drill Pipe, Rotary Table, Block, Hook, Swivel, Kelly and Light Plant.

Cardwell Trailer-Rig. 7¾ x 18 Wheeland and C 12 Emsco Pumps. Drill Pipe, Rotary Table, Block, Hook, Swivel, Kelly and Light Plant.

Model RL CARDWELL Spudder, skid mounted with D 13000 Caterpillar Motor.

Wilson-Mogul double drum Draw Works with sub structure, Mast, G K U Waukesha motor.

FRANKS single drum Draw Works with Mast mounted on International L 190 Tandem Truck.

Two Drilling in Units consisting of Guiberson Head with Waukesha motor, skid mounted.

D. Jack Simmons, P. O. Box 213, Farmington, N. M., Phone 322R.

**FOR SALE—USED HEATERS**

1—National 300# Steam Condensing Heater, 24" x 7'6"—500,000 BTU/hr., N.B. #72, Serial No. DH 3512-78A, Dr. #DH 104 WP 300 PSI H.T. Surface 85 Sq. Ft.

1—Alcorn Combustion Co. Portable Type 7-HX Gas Fired Heater with 14 (7 each end) Selas Co. Refrak Screen Burners capable of delivering 802,000 BTU/hr. to 2900 lbs./hr. of 0.6 Sp. Gr. Natural Gas. Maximum safe working pressure 840 PSI.

The heaters are located at plant near Bloomington, Texas, and may be inspected after contacting N. E. Waldie, Purchasing Department, Humble Oil & Refining Company, Houston, Texas.

■ **TWO 150 horsepower F and T boilers located at Eunice, New Mexico, Makin Drilling Co., Box 131, Hobbs, New Mexico.**

**FOR SALE**

Oil Leases—997 acres, 473 wells. 500 additional proven acres to be drilled for secondary recovery. 4 water pressure plants, completely electrified. 45 core tests on various leases. $275,000 or best offer takes all. Paul R. Baldwin, Baldwin Producing Corporation, Route 5, Medina, Ohio.

■ **DOODLEBUGGING — DOWSING — DIVINING.** A scientific and unprejudiced analysis of the influence of electromagnetic fields on psychic phenomena, with particular attention to divining (doodlebugging). **PSYCHICAL PHYSICS** by S. W. Tromp, Professor of Geology, Fouad I University, Cairo (Egypt), is a 534 page volume (153 illust.) in which the author analyzes all existing knowledge of divining phenomena. Oil operators will find this book thought provoking. Only 400 copies left. Write now for yours. Price $8.00. ELSEVIER PRESS, 402 Lovett Boulevard, Houston 6, Texas.

# New Books, Maps and Movies

**SALT WATER DISPOSAL EAST TEXAS FIELD,** Staff of East Texas Salt Water Disposal Company, Petroleum Extension Service, The University of Texas Division of Extension, Austin, March, 1953.

The Petroleum Extension Service has produced this book in cooperation with the Texas Education Agency Trade and Industrial Service and the East Texas Salt Water Disposal Company, Tyler, Texas. Considerable research into the many new problems peculiar to the business of collecting, transporting, treating and subsurface disposal of salt water has been done by the East Texas Salt Water Disposal Company and the findings are shared in this book. Such subjects covered are the design of salt water gathering systems, the selection and maintenance of pumps and prime movers, construction of salt water disposal facilities, treatment of salt water for injection, injection wells for salt water disposal, and measurement of salt water. The report is well illustrated with pictures and tables.

•

**IRA RINEHART'S OIL & GAS DIGEST,** Rinehart Oil News Co., P. O. Box 1208, Dallas, Texas.

Rinehart Oil News Company has inaugurated a second monthly edition of "Ira Rinehart's Oil & Gas Digest," a comprehensive summary of well completion information covering current discoveries, important extensions and significant dry wildcats in the Rocky Mountain area, including the Williston Basin. Similar to the pocket size format of the companion publication started more than a year ago, on Texas, South Louisiana and New Mexico, the new Digest is to serve as a correlation manual and an operations guide for every phase of exploration, development and investment planning. Each well is reported on a separate page with completion data and a section of the electric log printed on the front side and a plat of the area on the back.

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**NEWS MAGAZINE OF THE SCREEN,** Warner Pathe News, 625 Madison Avenue, New York 22, N. Y.

A monthly newsreel for students in schools and colleges of 11 Midwest states is sponsored as a public service by Standard Oil Company. Produced by Warner Pathe News under the guidance of an advisory board of educators, the movies will be reports on world and national events, carrying a Standard Oil Company credit line but no advertising. Standard will sponsor the films in Illinois, Iowa, Nebraska, Kansas, North Dakota, Missouri, Minnesota, South Dakota, Montana, Wyoming and Wisconsin in the 1953-54 school year. Free to schools and colleges, the film will be distributed by various university and local school visual aids libraries and not by Standard. Issued with the films, which are from 22 to 25 minutes long, are copies of a synopsis of the contents and a classroom guide for teachers containing suggested questions and answers.

•

**COAL PREPARATION,** Second Edition, American Institute of Mining & Metallurgical Engineers, 29 West 39th Street, New York 18, N. Y. $5.60 to AIME members and $8 to nonmembers.

This book shows the theory back of the many processes used in coal preparation and will be useful to those whose daily work is concerned with preparation and to consumers who use the product produced at the up-to-date plants throughout the country.

•

**A STUDY OF ASPHALTS AND ASPHALTIC MATERIALS,** George W. LeMaire, Department of Publications, Colorado School of Mines, Golden, Colo. $1.50.

LeMaire is associate professor of petroleum refining at the Colorado School of Mines. His is a practical guidebook to asphalts, including their manufacture and tests. Included are a section on recent research of bituminous materials and 23 illustrations.

•

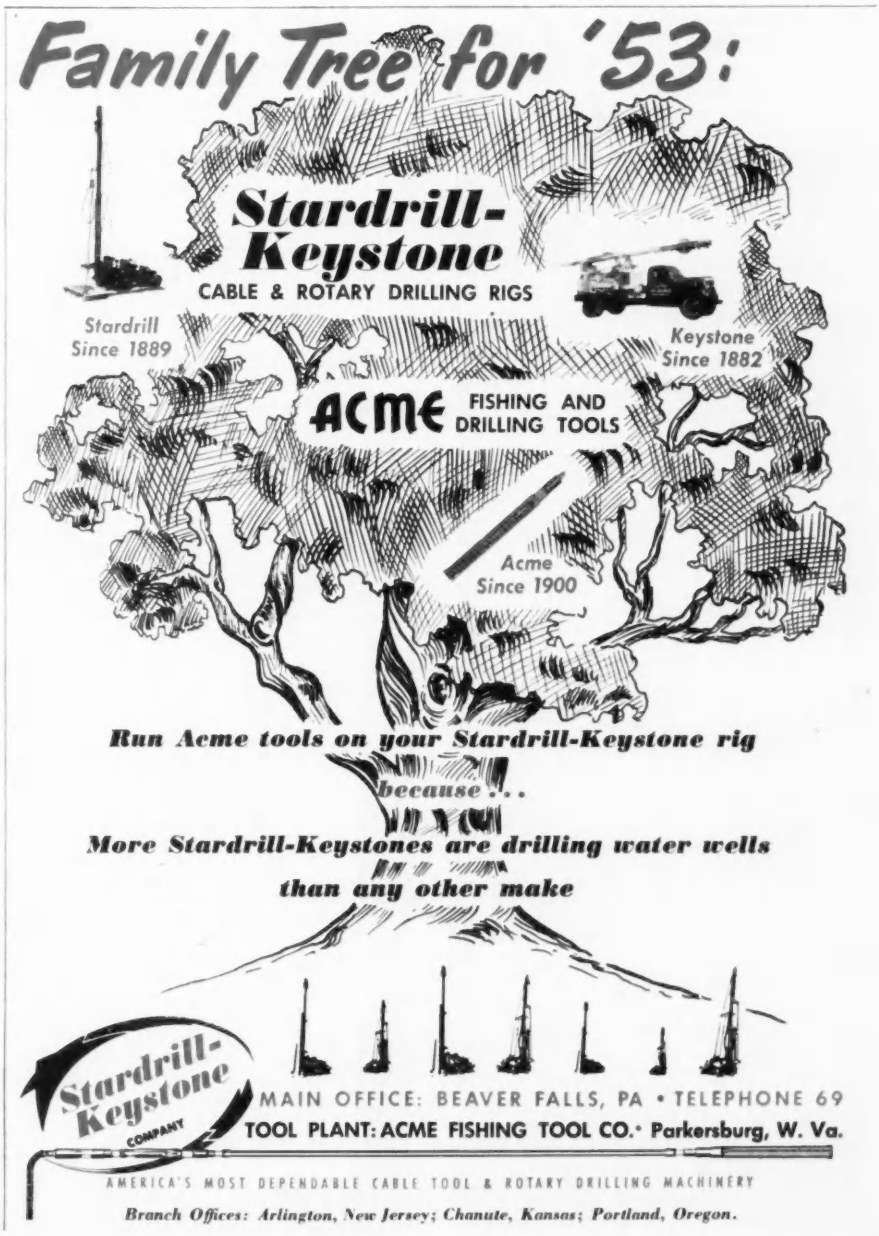
**CROSS SECTIONS OF THE TEXAS GULF COAST,** Richard L. Porter and Calvin A. Chimene, Five Star Oil Report, Petroleum News Corporation, Houston, Texas, 1953.

A new look at the Gulf Coast subsurface in recent years is presented in this publication which was compiled originally as a thesis by Porter and Chimene, now geologists with leading oil companies. An integration of Gulf Coast stratigraphic information for two narrow belts is presented and the methods used are those encountered in geologic practice in the Gulf Coast.

•

**BRITISH PETROLEUM EQUIPMENT,** 1953, Fourth Edition, Council of British Manufacturers of Petroleum Equipment, 79 Buckingham Palace Road, London S.W. 1.

This catalog is the only publication in Britain which gives a detailed picture of the British petroleum equipment industry and the range of equipment, components, materials and services which it now provides.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# SQUEAKS from the BULLWHEEL

## Baby Talk

The little boy sat on the curb and sobbed as though his heart were breaking. The kind old lady stopped and asked, "Is a itta bo cywyin? Tum, tella nace wady wassa matter."

"If you're inquiring as to the cause of my lachrymose conditions," he answered, "it is because I have been unable to find any suitably intelligent playmates whose eugenic constitutions are in harmony with my pathological tendencies and whose hereditary affiliations meet with the approval of my parental relations since we moved to this danged place from Boston."

•

## Power of Description

A young man was patiently waiting in front of the post office stamp window while two female clerks were busy talking.

"Her evening gown," said one, "was of metallic brocade, had a braided bow, with inverted gores, and full sleeves."

When she stopped for breath the young man broke in, "I wonder if you could sell me a neat purple stamp with perforated hem, steel engraving, and the whole back treated with a coating of lovely mucilage and costing three cents?"

•

## One Too Many

"One wife too many!" explained Mrs. Nagger as she glanced at the headlines. "I suppose this story is about some bigamist."

"Not necessarily, my dear," her husband replied. "Not necessarily."

•

## Temper, Temper!

A prime old Quaker lady was driving her new car when suddenly a heavy truck rammed into her front fender, wrecking the whole front end of the car. Infuriated, the lady managed to control herself only by remembering her Quaker upbringing. She got out and walked over to the driver. "When thee gets home to thy kennel tonight," she said, "I hope thy mother bites thee."

•

## Not Just Politics

"I wouldn't vote for you if you were St. Peter himself."

"If I were St. Peter himself you would not be in my precinct."

•

## Disillusioned Lover

A bachelor met a girl at a dinner party and fell in love with her at first sight. During the course of the evening he was staggered by the extent and variety of her many accomplishments. Obviously she was the perfect girl, the girl of his dreams, and he told her so all the way home in the taxi.

Before bidding her good night, he took her key and opened the door for her. There, in the middle of her living room floor, was a dead horse.

The man stared at it aghast.

"Well," said the girl of many virtues and accomplishments, "I didn't say I was neat, did I?"

•

## Extra Precaution

The medical officer was testing the water supply.

"What precautions do you take against infection?" he asked the sergeant-in-charge.

"We boil it first, sir," said the sergeant.

"Good!"

"Then we filter it."

"Excellent!"

"And then," said the sergeant, "just for safety's sake, we drink beer."


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GOTKOOL WATER CAN
Made in 1½, 2, 3, 5, 10, 15 and 20 gallon sizes. Push-Button Faucet at slight additional cost.

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# What's NEW

In Perforating, Logging, and Fishing Tool Services

McCULLOUGH
NEW SERVICES • NEW TOOLS
NEW WAYS OF DOING THINGS

*Latest News About New Tools, Techniques and Services*

## "The security of your entire drilling investment may depend on the reliability of your logging information"

That's why operators everywhere are specifying dependable McCullough Radiation Well Logging utilizing the amazing new Scintillometer. It is the most accurate and reliable logging instrument available to the oil industry. It is a stable instrument, and because of its stability, it is consistently reliable—one or ten trips in the well, you'll always get the same answer.

AND HERE'S WHY—

**1.** The Scintillometer is very short compared to the length of gaseous type counters. This enables the measurement of formations with a great deal more detail. It will measure and define very thin beds that would be averaged out with the longer counters.

**ACCURATE–RELIABLE–CONSISTENT–STABLE**

**Gamma Ray and Neutron Logs**

**McCULLOUGH**

**Radiation Well Logger**

**with SCINTILLOMETER**

**2.** The efficiency of the Scintillometer in measuring radiations approaches 100%. Gaseous type counters may have an efficiency in the order of 2% or less.

**3.** As a result of the short length and high efficiency of the Scintillometer, a much more detailed log can be produced at a faster logging speed than with other methods.

**4.** The Scintillometer responds only to external excitation and thus can be calibrated on an absolute scale. This scale is in International Units and assures a more accurate quantitative interpretation.

**5.** Because of the extreme stability of our equipment, we are able to duplicate successive runs in the same well with accuracy.

**6.** Characteristics such as time constant and sensitivity are controlled at the surface. Thus, these variables can be set to provide the operator with as much or as little detail in his log as he desires.

**7.** The Scintillometer will record the entire range of gamma radiations, or only a certain band within the range can be recorded if desired.

**8.** It has no instrument, temperature nor discernable cosmic drift and can be used as a valuable reference tool.

**9.** Simultaneous recording of a collar log simplifies "pin-point" perforating later.

**10.** The original record is reproduced as the final log—no retouching nor tracing is necessary.

**THE McCULLOUGH RADIATION WELL LOGGER WITH SCINTILLOMETER (GAMMA RAY AND NEUTRON LOGS) IS AVAILABLE IN MOST ACTIVE OIL FIELDS—CALL YOUR McCULLOUGH SERVICE ENGINEER FOR COMPLETE INFORMATION.**

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**VENEZUELA:** United Oilwell Service Co., S.A.; Caracas, Anaco, Maracaibo

SERVICE LOCATIONS: **TEXAS:** Houston, Snyder, Alice, Cisco, Corpus Christi, McAllen, Odessa, Tyler, San Angelo, Victoria, Wichita Falls, Luling, Beaumont, Sherman, Midkiff, El Campo. **OKLAHOMA:** Oklahoma City, Guymon, Healdton, Hominy, Wewoka. **ARKANSAS:** Magnolia. **MISSISSIPPI:** Laurel. **NEW MEXICO:** Hobbs. **KANSAS:** Great Bend. **WYOMING:** Casper. **CALIFORNIA:** Los Angeles, Avenal, Bakersfield, Ventura. **LOUISIANA:** Houma, Lake Charles, New Iberia, Shreveport. **COLORADO:** Sterling. **NORTH DAKOTA:** Williston. **UTAH:** Vernal.

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SEE OUR CATALOG IN THE COMPOSITE CATALOG

*—or write direct to:*
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Box 831 Borger, Texas

## Big Joke!

Fond of practical jokes the Easterner sent his friend on the coast a collect telegram which stated simply: "I am perfectly well."

A few days later a heavy air express package arrived collect from the coast. Opening the package the Easterner found a block of concrete on which was written the message: "This is the weight your telegram lifted from my chest."

•

## The Perfect System

"Daddy, my teacher wants me to prove that the white man is superior to the Indian," said Johnny. "Can you help me?"

"Don't think so, son," replied Daddy. "When the white man took over the country the Indians were running it. There were no taxes. There was no debt. The women did all the work. How could they improve on a system like that?"

•

## Confessions

The poor woman was dying from a mysterious stomach seizure. She called her husband to her. "Ed, I must tell you before I go. I've been unfaithful to you!"

Ed nodded understandingly. "And what did you think I poisoned you for?"

•

## So Happy

"Snookums is so happy since she got married."

"Why?"

"Her boyfriend likes her husband."

•

## Definitions

Highbrow: One who can listen to the William Tell Overture without thinking of the Lone Ranger.

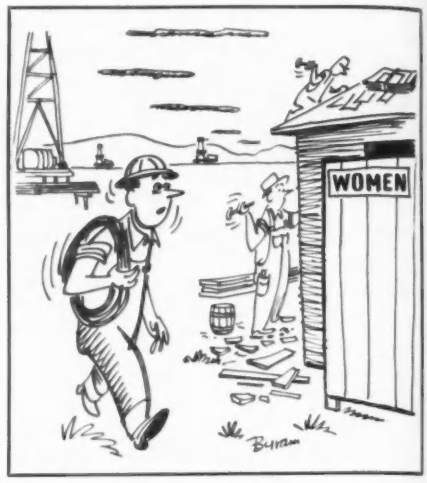
•

## Superstition

They heard the elevator door close and then the sound of a key entering the lock. "Quick," she said, "it's my husband. Jump out the window."

"But we're on the thirteenth floor!" protested her visitor.

"Blow Buster!" she commanded "This is no time to be superstitious!"




## Devoted Family

An old New England storekeeper was breathing his last and a sorrowful family surrounded his bed.

"Is May here?" he asked his wife wearily.

"Yes, Zeke," she replied. "And my oldest son?" "Yes." "And the other five boys?" "Yes." "And the four girls?" "Yes, Zeke." The failing patriarch struggled to a sitting position. "What's the big idea?" he shouted. "Who's tending the store?"

•

## Man Killer

Then there's the Sultan who kept his harem three miles from where he lived. Every day he sent his man servant to get him a girl. The Sultan lived to be eighty-seven, but the servant died when he was only thirty.

The moral of this story is: It's not the women that kill you, but the running after them.

•

## Vital Statistics

Statistics: At the age of 75 there are 18% more women than men.

At the age of 75 who cares.

*"It's oil, young lady ... LANE-WELLS on the job"*

# CONTRACT CORE IT WITH DIAMONDS

Hard or medium, deep or shallow, you'll recover more core at less cost (fewer trips) with Core Lab's Contract Diamond Coring. No bits to buy. No diamonds to inventory. No barrels and parts problems.

*There's a cost-per-foot-cut price established for Core Lab's Contract Diamond Coring in virtually all active areas. (And for Core Analysis, too.) Just call the Core Lab man nearest you. He'll take it from there!*

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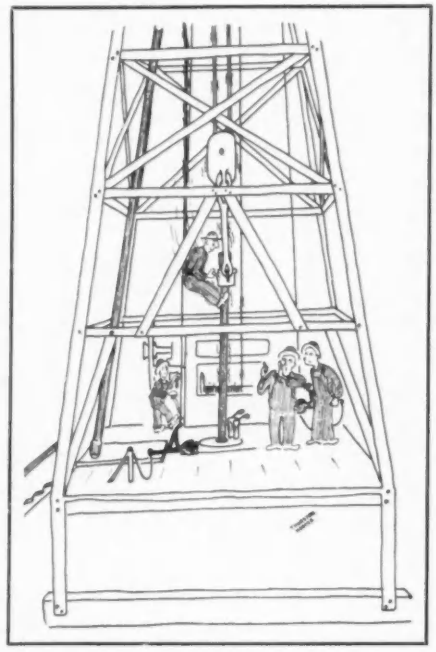

I can just tell that derrickman's buckin' for the next driller's job.

### Best Manners

The family and the dinner guest had seated themselves at the table, when the lady of the house noted an important omission. "Betty," she asked her little daughter, who had helped set the table, "why on earth didn't you put a knife and fork at Mr. White's place?"

"I didn't think he'd need them," Betty replied. "Daddy said he eats like a horse."

•

### Too Full

"What is she so angry about," asked the puzzled bridesmaid. "The paper gave a full account of her wedding."

"It certainly did," agreed the maid of honor with a giggle. "It even mentioned the fact that she was married to the well-known collector of antiques."

•

### Good Neighbors

The conductor was perplexed. "Who on earth," he sputtered, "would want to steal a Pullman ladder?"

Just then the curtains parted and a little old lady poked her head through cautiously. "Porter," she whispered, "you may use mine if you like. I won't be needing it until morning."

•

### Medical Specialists

Orthopedic Specialist: "The girls at these Florida beaches have beautiful legs, don't they?"

Lung Specialist: "I hadn't noticed, I'm a chest man, myself."

•

### Trapped

The inebriated husband tip-toed up the stairs. He patched up the scars of the brawl with adhesive tape, then climbed into bed, smiling at the thought that he'd pulled one over on his wife.

Came morning. He opened his eyes and there stood his angry wife.

"You were intoxicated last night," she said.

"Why, darling, I was nothing of the sort."

"If you weren't, then who put all the adhesive tape on the bathroom mirror?"

### Ambition

An asylum patient who had been certified cured was saying good-bye to the director of the institution:

"And what are you going to do when you go out into the world?" asked the director.

"Well," said the patient, "I have passed my bar examination, so I may practice law. I've also had quite a bit of experience in college dramatics, so I might try acting."

He paused for a moment, deep in thought. "Then on the other hand," he continued, "I may be a teakettle."


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